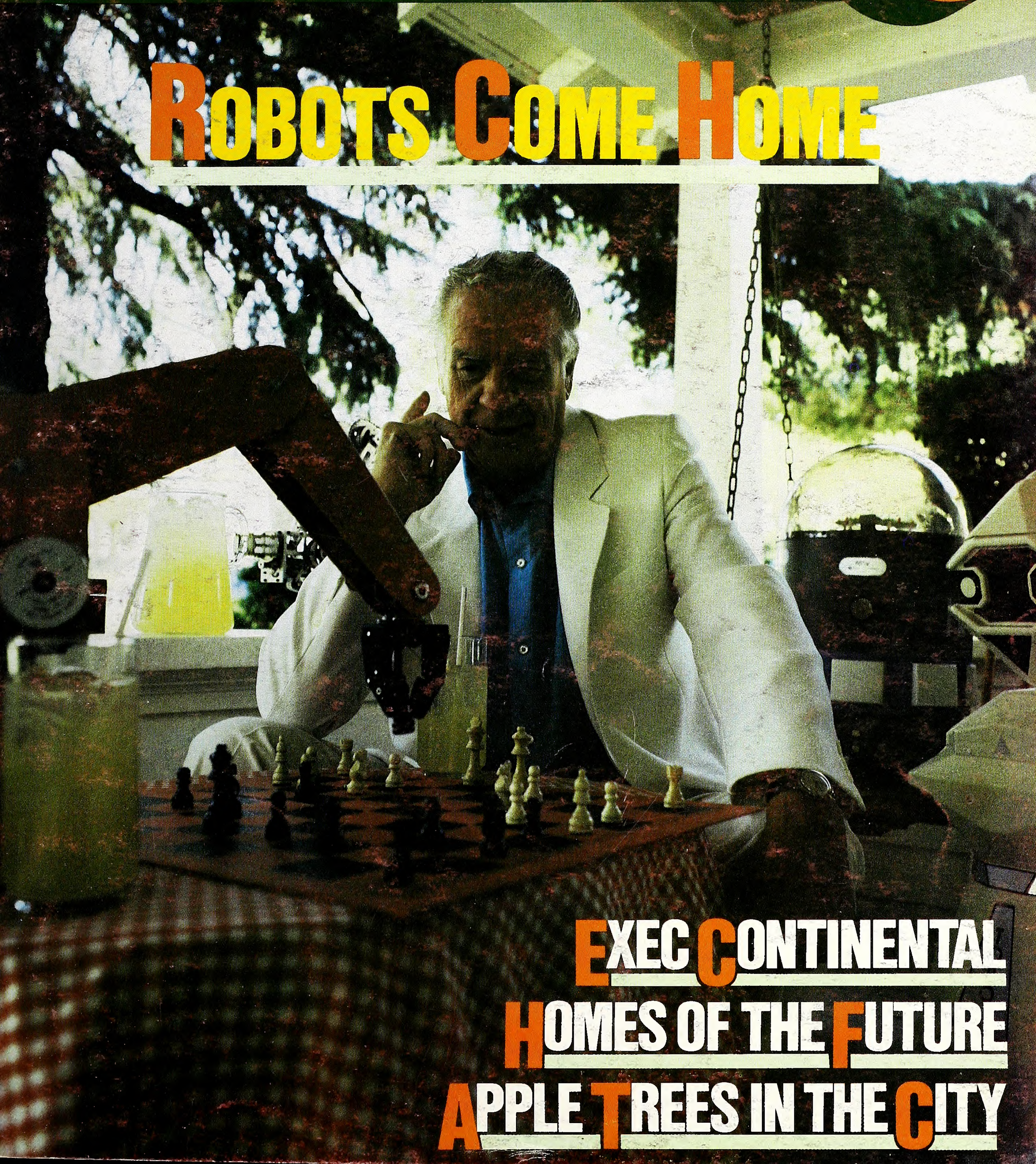
SOFTALK

VOLUME 3 AUGUST 1983 $3.00

ROBOTS COME HOME



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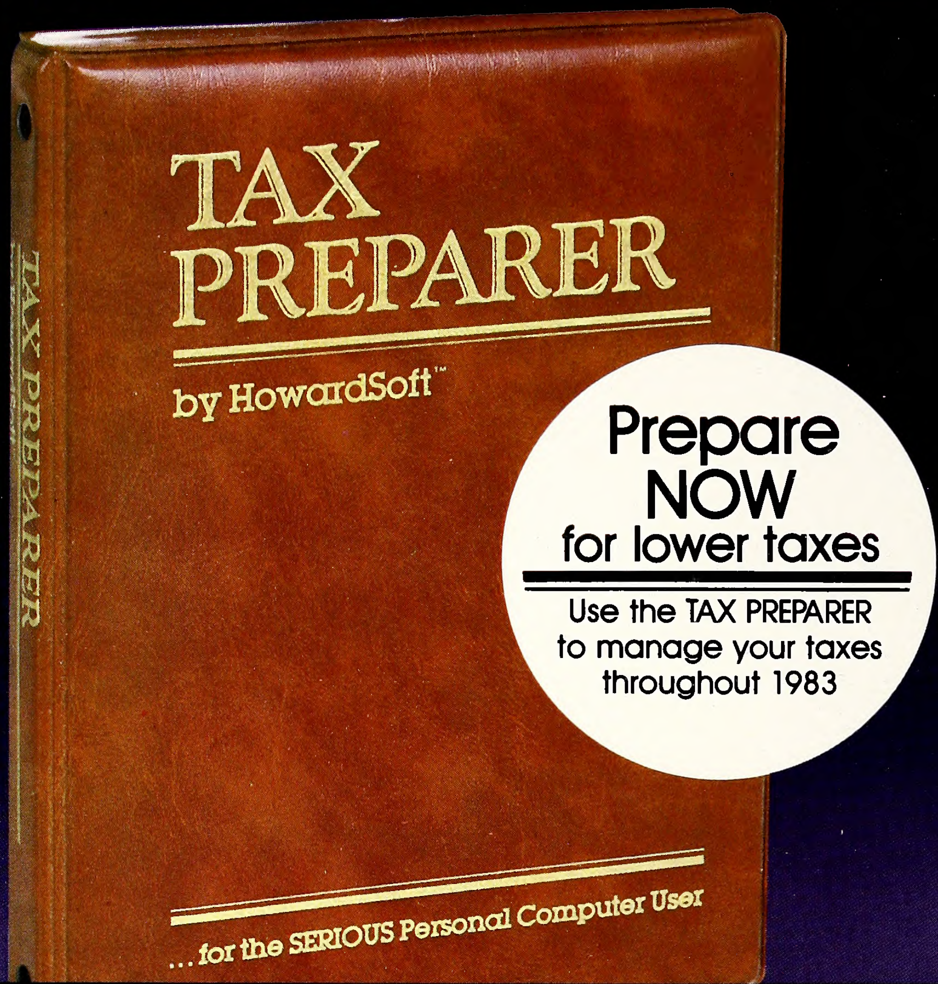

Already the best known software for preparing tax returns, this year's edition is much more:

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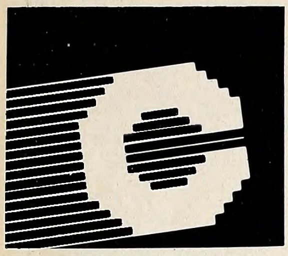
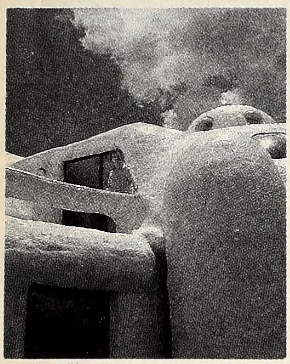


Exec Continental: In the Forefront of the Revolution

Led by charismatic Jim Sadlier, the Continental army is forging a solid path through the front lines of home and business software.

DAVID HUNTER 56



House and Computer

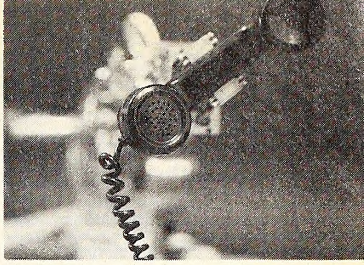
The home of tomorrow is available today—almost. Computers are active in models of future living, and the software is available now.

MICHAEL FERRIS 106

The Robots Come Home

Personal robots are here. They don't do much yet, but don't blink.

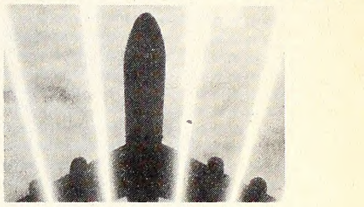
DAVID HUNTER 144



Fly Me to the Moon

All that vague stuff about what you can do with modems is straightforward and simple when it comes to making travel plans. Here's how.

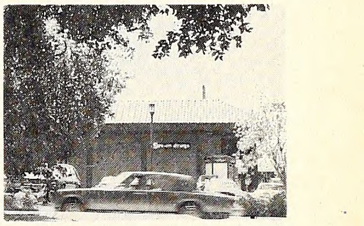
JOANN LEVY 178



A Shady Business: Urban Forestry

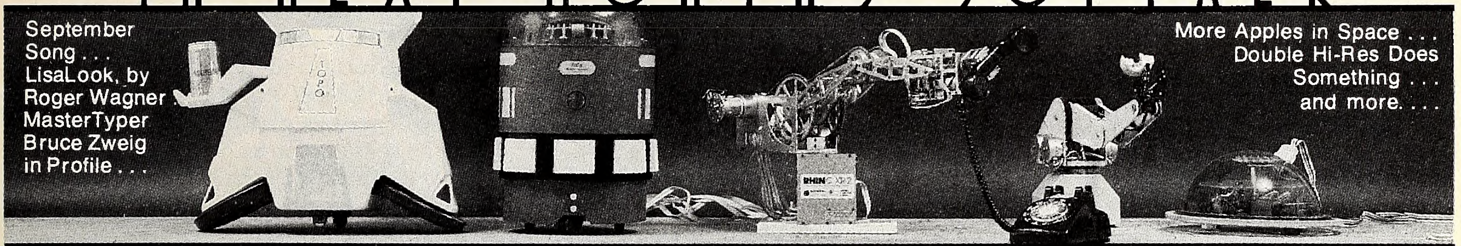
The proof of the pudding lay in the Apple. Even the bureaucrats sat up and took notice when the computer showed that Palo Alto, California, was losing its trees.

DENNIS BRISKIN 210



FEATURES · DEPARTMENTS

IN NEXT MONTH'S SOFTALK



INDEX OF ADVERTISERS

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Back Issues: $2 through February 1981; $2.50 through July 1981; $3.50 through September 1982; $4.00 thereafter. November and December 1980, January, February, March, September, October, and November 1981, and December 1982 are sold out. December 1981, February and May 1982, and February 1983 are in short supply.

Problems? If you haven't received your *Softalk* by the fifteenth of the month, or if you have other problems with your subscription, Hal Schick can help out. Call (213) 980-5074.

Moving? Send new address and old to Softalk Circulation, Box 60, North Hollywood, CA 91603; telephone (213) 980-5074.

Contest: Help Wanted

Did you know that before Ronald Reagan got into politics he was an actor? Of course you did. But did you also know that before that he worked as a counter person at Burger Palace? Probably not, since he didn't. But you can just imagine his job resume: "President, United States of America, 1981–present; Governor of California, 1967–1975; order taker at Burger Palace in Dixon, Illinois, 1927–1930." Okay, maybe not.

It works the same way in the microcomputer industry. Before a lot of people in this biz got where they are today, they held numerous other interesting jobs. What do you think they did back in the early seventies? It probably had little to do with Apples, since the word apple in those days meant pie and sauce, not *PIE* and SOS. Which brings us to this month's contest.

On page 4, you'll see a whole bunch of pictures of a whole bunch of people who make up the Apple world. On page 6 you'll see a list of various positions they used to hold. Can you match the occupation with the person? Could you do it for $100 worth of Apple accessories? Good! Roll your tongue back into your mouth and let's get started.

There are two ways to win.

The First Way. The first way is to match the person with the occupation. Just number your paper from one to twenty and write the corresponding person's name next to each number. Next, find the occupation you think each person used to hold, and write down the letter that precedes it next to that person's name. If you'd like to do this with a word processor or a typewriter so we can read your entry, the more power to you.

Whoever matches correctly the most people with their former occupations will become the *Softalk* Personnel Administrator of the month and will be entitled to a $100 shopping spree in the computer store of his or her choice. On us.

Most of the answers can be found in those *Softalk*s you put on the top shelf many months ago (we don't write the Exec series for nuthin'!). Others can be found by a process of elimination (someone as young as Lord British couldn't have been a former Vietnam commanding officer, for example). So get out the mags and get to it.

If you choose this way to win, print the words *What they were* on the front of your envelope and on your entry form. This way, you won't end up being scored in the wrong category.

The Second Way. This way is more fun; it's for people who don't have the resources for the first way to win. Some people just *look* like they might have held a certain job. Can't you just picture Ken Williams as a country bar bouncer? Dave Gordon as a used car salesman? How about Bill Budge as a young Chachi (as in *Joanie Loves . . .*)?

Just number your paper from one to twenty with each person's name by the number as before. Then, next to each name, put down a letter corresponding to the occupations you think they *look* like they might have held. If you don't know, then guess; if you can't guess, then make one up.

Entries in this category will be scored against the answer key made up by a consensus of the contest staff. Answers are purely subjective; no debating will be allowed.

The winner of this category will win the customary $100 in advertisers' merchandise that we usually give away in these alternative contests.

If you choose this way to win, print the words *What they should have been* on your envelope and on your entry form.

It ought to be fun, and it will be. So send in your entry with the information below postmarked by September 15, 1983. You must write either *What they were* or *What they should have been* on your entry so that we know which category to judge you in.

Send your entries to *Softalk* Job Hunt, Box 60, North Hollywood, CA 91603, postmarked by September 15, 1983.

My name: ______________________

My occupation: ______________________

My address: ______________________

My city, state, and zip: ______________________

____

My phone number: ______________________

My choice of prizes if I win: ______________________

____

My dealer: ______________________

ALL NEW GAMES FROM PENGUIN!

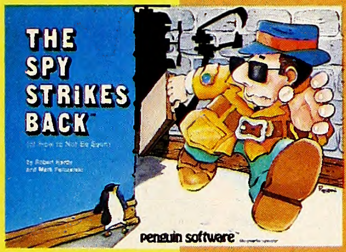
Minit Man™ by Greg Malone

When the first wave of robots hit the bridge you were having lunch. By the time you climbed into your chopper and reached the gorge, the damage was done! The bridge was shattered. That was about the time the radio started squawking about incoming missiles.

Your silos are empty, awaiting three interceptor missiles that had just been prepared for launching. Unfortunately, they are loaded on trains on the other side of the gorge, unable to get across the damaged bridge. Your job is to repair the damage and set the launch computer.

Simultaneously, the enemy's robots have penetrated the building complex in an attempt to sabotage the computer. If you don't stop them, saving the bridge would be pointless.

Available on Apple disk. **Only $19.95**



The Spy Strikes Back™

(or How to Not Be Seen) by Robert Hardy and Mark Pelczarski

The spy is back! Once again wit and stealth are the tools of his trade as he attempts to thwart an international terrorist's threat to blackmail the world community. Can you aid him in his efforts to evade the patrolling electronic guards, while searching the myriad rooms of a five-story castle, rounding up the clues needed to locate Dr. X's nuclear laboratory?

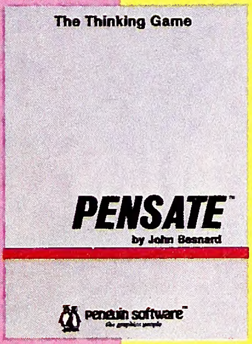
Colorful graphics, great sound, and real-time action make this new game maddeningly addictive!

Available on Apple disk, Atari 32K disk and 24K cassette. **Only $19.95**

PENSATE™ The Thinking Game by John Besnard

A thinking game of evasion, Pensate is an original in the board game genre. The object is to get to the top of an 8x8 grid while avoiding all other playing pieces. The computer has 10 types of pieces each of which moves in a pattern relative to the player's move. The higher the round, the more pieces on the board. Pensate features both one- and two-player modes and players can plot one to four moves ahead. There is a practice option in addition to tournament play. If you lose, you can watch an instant replay or even play the same game over.

Available on Apple disk. **Only $19.95**



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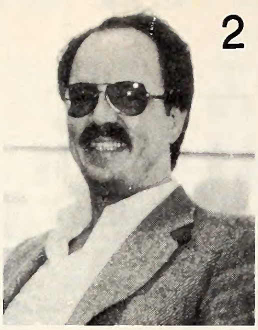

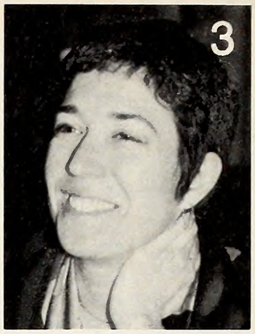

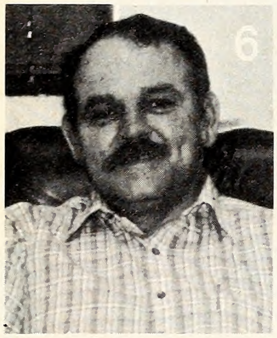

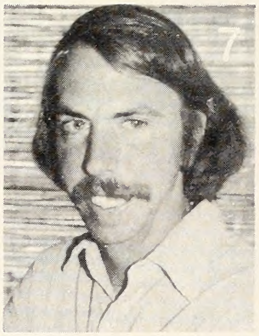

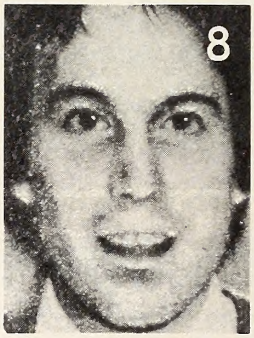

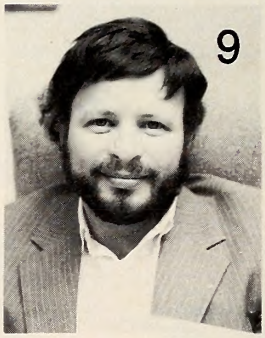

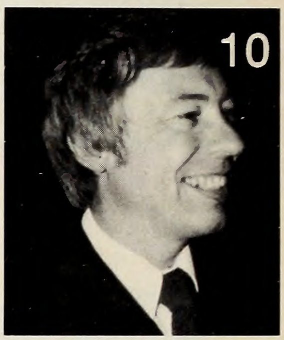

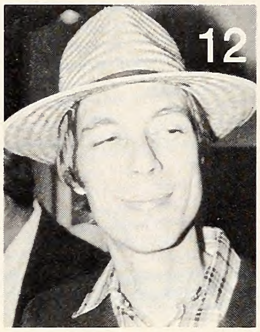

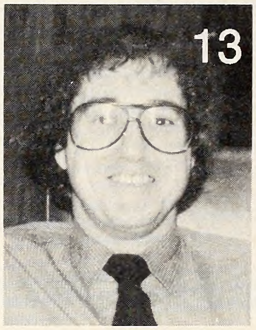

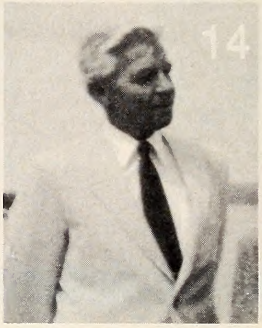

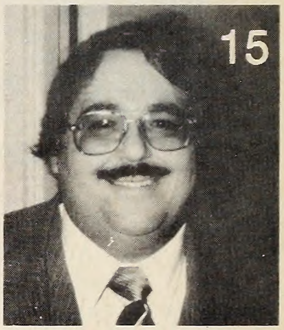

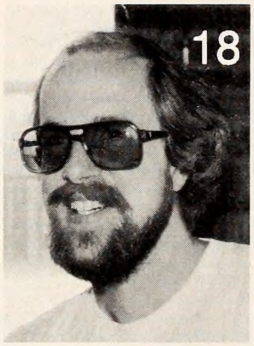

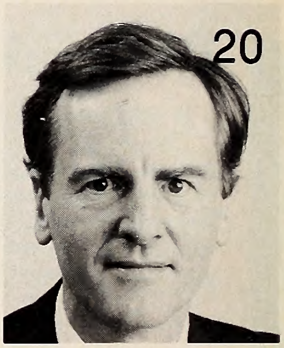

The Celebrities and Their Current Occupations

1. Ted Gillam. The joystick guy whose company, TG Products, made *Castle Wolfenstein* and *Choplifter* a breeze.

2. Ed Zaron, Muse. President, Muse, and author of *Super-Text*.

3. Ellen Lapham. Cofounder, Syntauri Corporation.

4. Jean Richardson. Director in charge of all those ads you see for Apple Computer.

5. Marc Blank. Infocom's *Zork*meister, vice president of product development, and all-around swell guy.

6. Terry Bradley. Cofounder and secretary treasurer of Sirius Software.

7. Jerry Jewell. Other cofounder of Sirius and company president.

8. Tom Snyder. Spinnaker Software author, *Snooper Troops* trooper, and searcher of the most amazing thing.

9. Nathan Schulhof. Kingpin of Silicon Valley Systems.

10. Mike Markkula. Former president of Apple Computer.

11. Mark Pelczarski. Chief bossman of Penguin Software, coauthor of *Graphics Magician*, lousy miniature golfer.

12. Roger Wagner. President of Southwestern Data Systems, writer of lots of software, and an even worse miniature golfer.

13. Stan Goldberg. Honcho for Micro Lab and inspiration for this contest.

14. Fred Sirotek. Sir-tech prexy, father of a few, dad to many.

15. Dave Gordon. Top of the heap at Datamost. Was never a used car salesman.

16. Sherwin Steffin. Chairman of the board and truant officer at Edu-Ware.

17. Doug Carlston. Prez and founder of Broderbund, philosopher behind the *Galactic Saga*, loving brother.

18. Gary Carlston. In charge of product development at Broderbund, loving brother.

19. Cathy Carlston. Marketing fist for Broderbund, loving sister.

20. John Scully. Apple's newest president.

Their Former Occupations

A. Medical student.
B. Biology teacher.
C. Math and computer-science teacher at high school, junior college, and university levels.
D. Operations researcher for savings-and-loan associations.
E. University Swedish instructor, women's basketball coach.
F. Certified public accountant.
G. General construction manager, manufacturer of souvenir spoons.
H. President in charge of presidency at PepsiCo.
I. Lawyer.
J. Rock musician under Capitol Records.
K. Junior high school English teacher.
L. Merchandise buyer for Lord and Taylor.
M. Behavioral scientist.
N. Garment district mogul.
O. University of Michigan disc jockey, jazz drummer.
P. Marine insurance salesman.
Q. Amateur pilot, Regis McKenna public relations person who handled Apple's account.
R. Housewife.
S. United States Air Force lieutenant colonel.
T. Retired.

A Hot Day in San Jose

And here to present the award for Oscar predictions is Jean Mattson, owner of ComputerLand, Gillette, Wyoming. That's Oracle winner David Miles accepting the award for himself.

One thousand two hundred twenty points. That's all Jeremy Stamer (Glen Rock, PA) scored on his Maypole contest entry, and that's all it took to win.

Stamer's entry consisted of six chains fourteen links long, earning ten points per link (6 × 14 × 10 = 840 points). Nineteen of the eighty-four links were Apple-related, giving him a bonus of twenty points each (19 × 20 = 380), for a total of 1,220 points.

With his maypole points in hand, Stamer will be marching down to his store to pick up a Kraft joystick and Strategic Simulations's *Cosmic Balance.*

Stamer's entry was not the longest, nor was it the one with the most Apple references. But it was the one with the best combination of the two.

Hot Fun in the Summertime. The winner of the fifth part of the Oracle contest was decided on July 4. That part, you might recall, required contestants to predict the high temperature in San Jose on Independence Day.

San Jose isn't exactly known for its cool temperatures, but it's not exactly Palm Springs, either. The safest thing to do would have been

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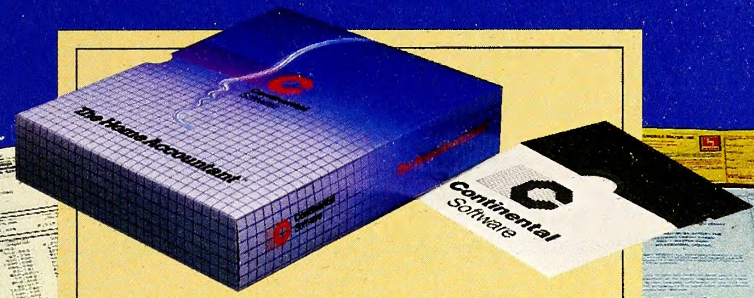

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Let's say you write a check to pay your Visa. The Home Accountant™ automatically debits your checking account and credits your Visa account.

And it does this with every one of the two hundred* budget categories: credit cards, checking accounts, money markets, cash, rent checks, insurance payments—you customize your own financial package.

Check out The Home Accountant™ soon. You'll find it does a lot more than simply manage your money.

It manages your money simply.

*The Home Accountant™ is available for the Apple II/IBM Personal Computer/Atari 400/800 Computers/Osborne/TRS 80 Model III/Commodore VIC 64. The actual budget capacities will vary with each computer.

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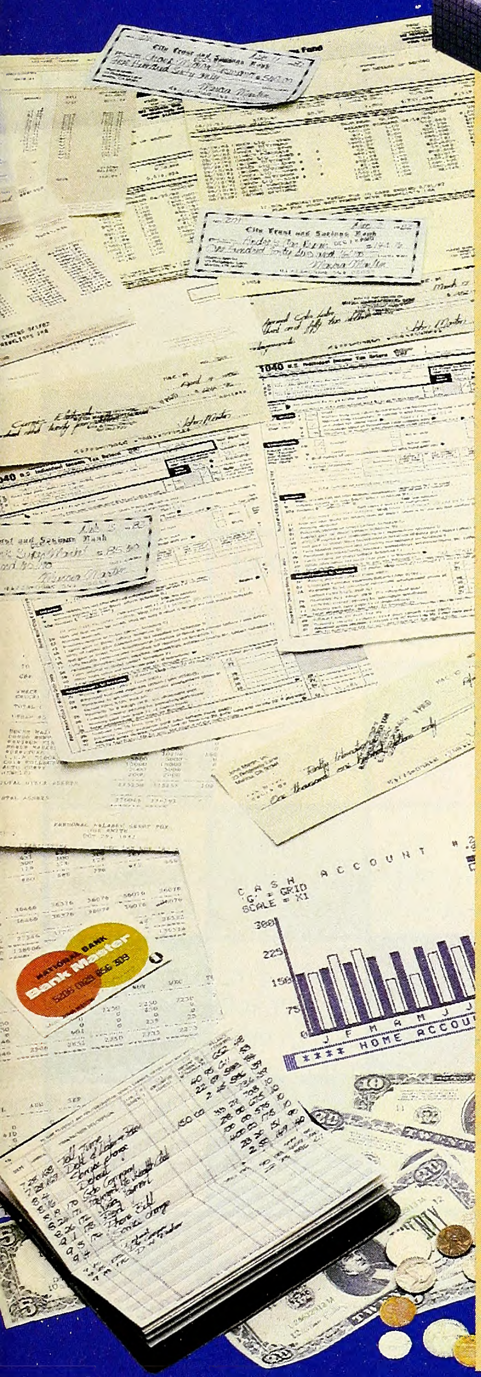

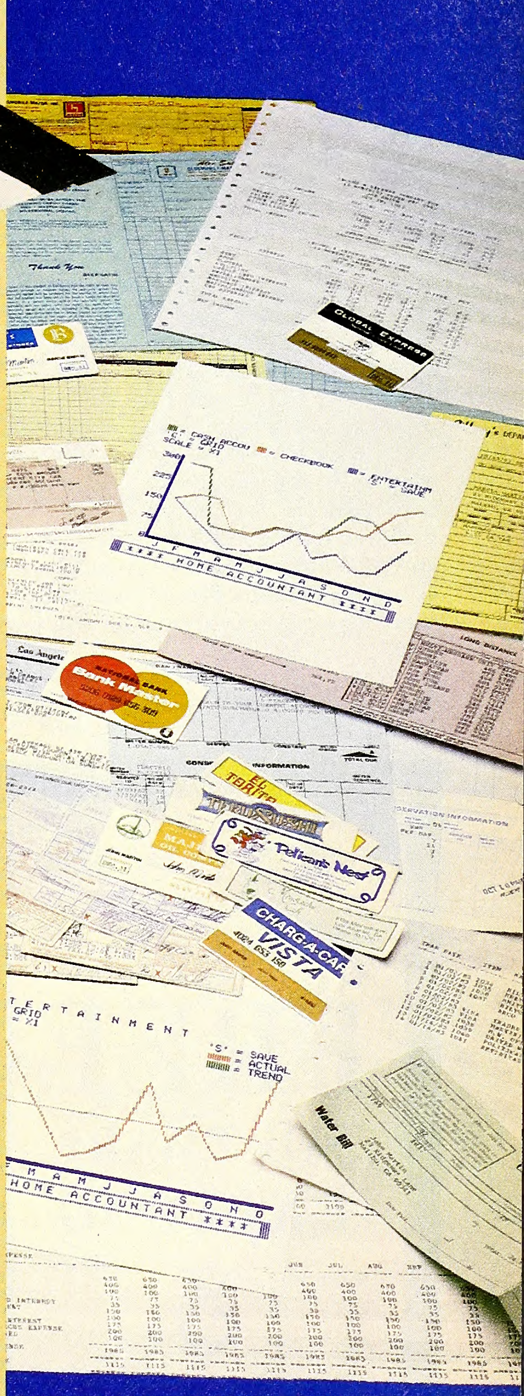

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to pick a temperature not too low and not too high, and that's what most people did.

According to the National Weather Service, San Joseans held their annual weenie roasts, picnics, and potato sack races in a sizzling ninety degrees Fahrenheit. According to the random number generator, David Cook (Decatur, IL) was selected from a field of just a handful who predicted that temperature.

"I had pretty much given up hope of winning anything," said Cook, whose other predictions included Sally Field as Best Actress and Leadfoot as the Kentucky Derby winner.

Cook won't care what the weather is like when he goes trotting down to Main Street Computer in Decatur to pick up Infocom's *Zork II* and Sir-tech's *Legacy of Llylgamyn*.

The race for the Apple IIe goes on. The leaders are mostly the same, but there has been some jockeying for position coming down the final stretch. Michael Wolgelenter (Palo Alto, CA) moved up from third to first this month with forty-five points; June's winner, David Miles (Gillette, WY), held on to his second-place spot with forty-four; Edward Radanovich (Bellevue, NE) dropped from first to third with forty; Carl Webb (Vista, CA) kept a grip on fourth with thirty-four points; and a newcomer, Geraldine Bass (Williamsburg, VA), joined the top five this month with twenty-seven points.

Report back here next month when June's final-exam scores come in. Class dismissed. ⌐■

JOYSTICK TRACK BALL		SOFTALK FASTALK		LISA GIRLFRIEND	
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GOLD WATER HIGH VOTES		GAME PEST PATROL		POISON OVERDUE BILLS	
	GOLD BUGS FLY WARS		NAME MR. BILL		DISEASE HIGHLY TOXIC WASTES
EPIDEMIC MICROBE		GOLDFINGER MR. HANDS		TMI WASTE	
	SICKNESS DOCTOR		FINGER PAINT WASTE PAPER		IBM MICROCOMPUTER
BMW MECHANIC		CURE WASTE TREATMENT		ZOOM GRAPHICS GRAPHICS INTERFACE	
	TANKTICS WASTE CREATION		CREATION PKASO		APPLE ARTIST ARTIST
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	PENCIL SKETCH PENCIL CASE		COMBAT COMMANDER		SYDNEY DEVELOPMENT MASTERPIECE DEVELOPMENT

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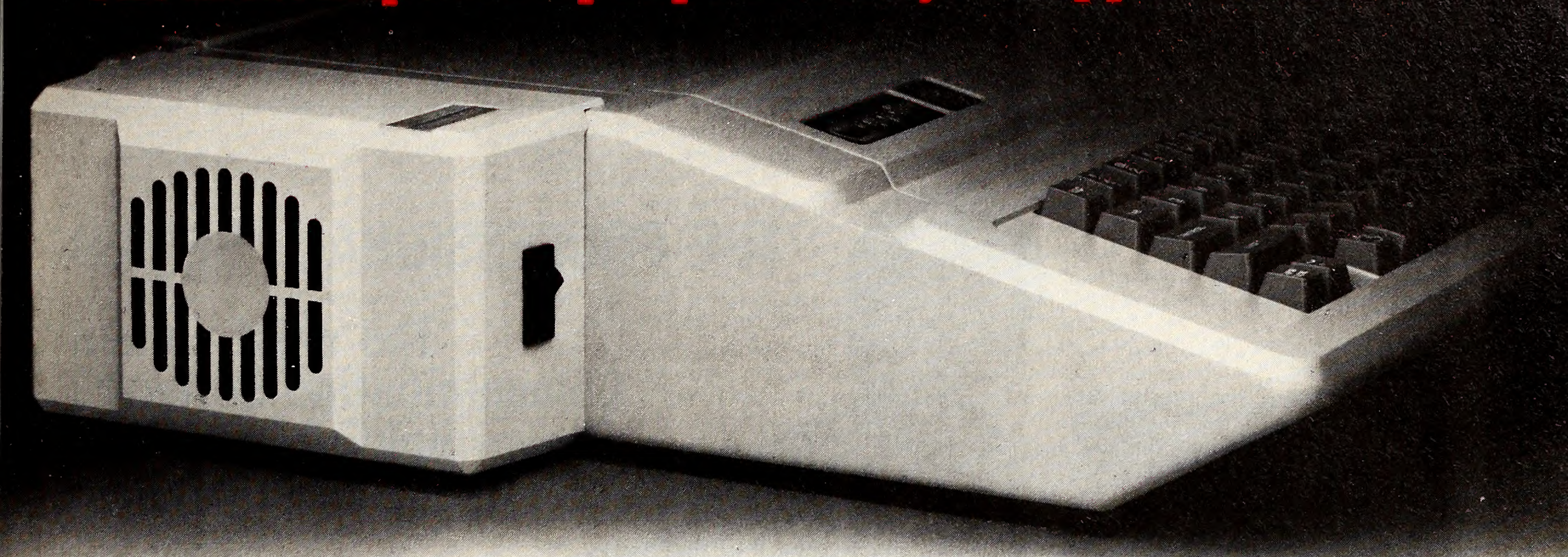
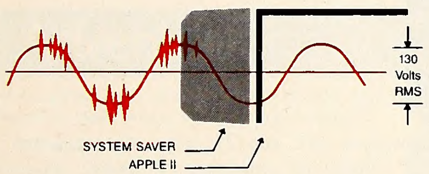
The most important peripheral for your Apple II and IIe.



For Line Surge Suppression

The SYSTEM SAVER provides essential protection to hardware and data from dangerous power surges and spikes.

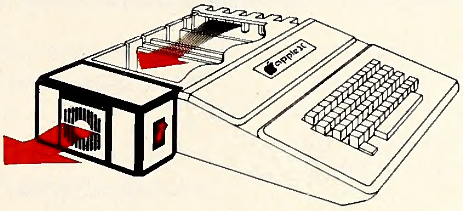


By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 Volts RMS/175 Volts dc level. 2) High frequency noise is smoothed out before reaching the Apple II. A PI type filter attenuates common mode noise signals by a minimum of 30 dB from 600 khz to 20 mhz, with a maximum attenuation of 50 dB.

For Cooling

As soon as you add 80 columns or more memory to your Apple II you need SYSTEM SAVER.

Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.



SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.

For Operating Efficiency

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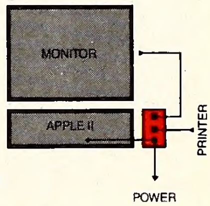

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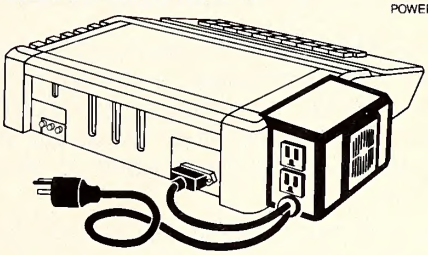

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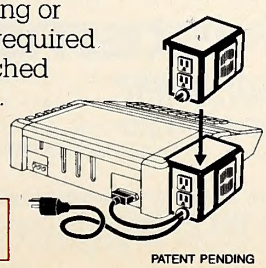

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PATENT PENDING

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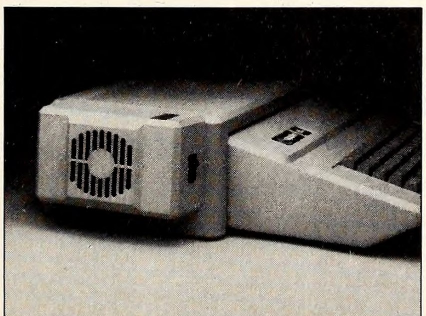

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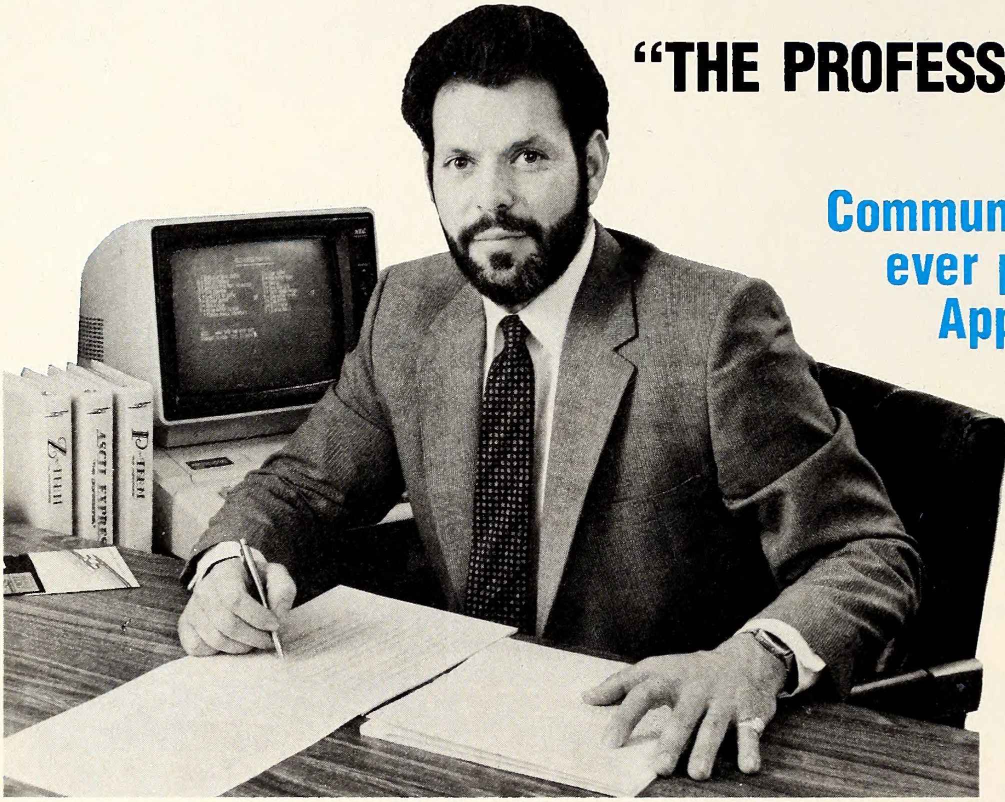
Communication Software



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FASTALK

Fastalk is a quick guide to popular, specialized, new, and classic software. When you need a particular kind of program or just want to see what's new, Fastalk is the place to look for fast answers.

If a program has been reviewed in *Softalk*, it carries the issue date of the review in italics at the end of its listing, and the capsule description given reflects the published review.

A new software entry, which must be of professional quality to be included, is designated by a check mark preceding its name. A new entry loses its check mark after its first appearance and drops out of Fastalk after one to three appearances (depending on genre) if it fails to gain popularity.

A bullet preceding a title indicates a program that *Softalk* has designated as a classic, based on its ability to stand up over time, its significance for its time (breaking new ground or introducing a new genre), or its archetypal qualities.

Other entries in Fastalk are there either by virtue of current activity (the programs are selling at least as much as the least-selling entry on any of the bestseller charts) or because they are representative of the best of programs for a special interest or need (such as card games or non-Basic-specific language terminal programs).

Softalk may arbitrarily omit any package from Fastalk, whether or not it meets the foregoing criteria.

Adventure

Adventuresome story games in which players must deduce commands, make maps, and solve logical puzzles.

● **Adventure.** Crowther, Woods. The original text adventure, created on mainframe, contributed to by many over a long time. Very logical within fantasy framework, excellent puzzles, maps; complex, convoluted, and great. Several publishers: Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $28.95. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $35. Frontier Computing, Box 402, 666 N. Main St., Logan, UT 84321. $10.

Critical Mass. Blauschild. Rungistanian author's next adventure; more colorful graphics, sophisticated and challenging puzzles. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *7/83.*

● **Cyborg.** Berlyn. Text adventure with brief action skill game hidden in plot. As a futuristic part man, part robot, you're lost in a strange forest, desperately needing food and power. At its release, in its realism and use of true plot, *Cyborg* represented one of the most significant advances in adventuring since the original *Adventure.* Sentient, Box 4929, Aspen, CO 81612. $32.95. *11/81.*

The Dark Crystal. Williams. Hi-res adaptation of fantasy movie. New puzzles challenge even those who've seen the movie. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $39.95. *4/83.*

Deadline. Blank, Lebling. Episode one in a series of murder mysteries by the authors of *Zork.* Includes inspector's casebook, lab report. Text. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *8/82.*

✓ **Death in the Caribbean.** Hess. The professor died trying to find buried treasure on the deserted island, and now the quest is yours. Beware of his mischievous ghost. Micro Lab, 2699 Skokie Valley Rd., Highland Park, IL 60035. $35.

Escape from Rungistan. Blauschild. Graphics adventure with some animated real-time puzzles. Espionage theme. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *8/82.*

● **Hi-Res Adventure #1: Mystery House.** Williams. Whodunit in a Victorian mansion. First adventure with pictures. Two-word parser with logical comprehension. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $24.95.

● **Hi-Res Adventure #2: The Wizard and the Princess.** Williams. The king has offered half his kingdom to the one who will bring back the kidnapped princess. Cross mountains, deserts; battle the wizard to claim your reward. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $32.95. *11/80.*

Mask of the Sun. A unique animated graphic quest with full though sometimes frustrating parsing. Moving from room to room involves seeing scenery along the way go by—a graphics breakthrough with nice puzzles. Ultrasoft, 12503 Bell-Red Rd., #200, Bellevue, WA 98005. $39.95. *11/82.*

● **Prisoner 2.** Mullich. Totally relandscaped but loyal version of original game: full-color hi-res graphics added, puzzles reworded, obstacles expanded. Sophisticated and difficult exercise in intimidation with elements of satire. Escape from an island requires player to solve logical puzzles, overcome obstacles, and answer riddles. Excellent computer fare; nothing else like it. Edu-Ware, Box 22222, Agoura, CA 91301. $32.95. *The Prisoner, 3/81; Prisoner 2, 10/82.*

The Quest. Snell, Toler, Rea. As the king's newest advisor, you must accompany a champion on a dragon-slaying mission. Champion, parser accept advice in full and multiple sentences. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95.

● **S.A.G.A. Series.** Adams. Scott Adams's prototypical adventures—12 in all—spruced up with 100-color graphics and Votrax vocals. Fun, not always logical, very story-oriented series. Each adventure has its own theme and often exotic locale. They map small but score big on imagination. Adventure International, Box 3435, Longwood, FL 32750. $29.95 each.

Serpent's Star. Anson, Clark, Franks, Ormsby. Mac Steele searches the Himalayas for a legendary sapphire in *Mask of the Sun* sequel. Traps are less obvious. Delightful glimpse of a faraway mystical land. Ultrasoft, 12503 Bell-Red Rd., #200, Bellevue, WA 98005. $39.95. *4/83.*

Sherwood Forest. Holle, Johnson. Dating game in legendary times. In premier *Softoon* adventure featuring neat UltraRes graphics. Robin Hood woos Maid Marian all the way to the honeymoon. Go for it. Phoenix Software, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $34.95. *3/83.*

Starcross. Science-fiction prose adventure that comes wrapped in a flying saucer. Set in the year 2186, main puzzle is to discover *raison d'etre* of miniworld asteroid. Likable, engaging. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *11/82.*

Suspended. Berlyn. Well-plotted adventure demands control of six independent robots who can act simultaneously. Intelligent, challenging exercise in logic. A milestone. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *4/83.*

● **Swordthrust Series.** Set of adventures, seven so far, that integrate fantasy role playing. Create one character, make friends in each new adventure, battle monsters, and achieve goals together. Good stories, fun to map. Vocabulary no mystery, but puzzles are. Single character goes through all. CE Software, 801 73rd St.,

Finally, aliens your kids can reason with instead of destroy.

Des Moines, IA 50312. Number 1 prerequisite for rest. Each adventure, $29.95. *8/82.*

Transylvania. Antiochia. Some of best graphics ever in a hi-res adventure. Excellent puzzles and logic—no unfair tricks. Enjoyable. Penguin, 830 4th Ave., Geneva, IL 60134. $34.95. *6/81.*

Witness. Galley. It's 1938, a society woman is dead, the killer is loose and may strike again. You have 12 hours to figure out whodunit before someone else takes the deep six. It may be you. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *7/83.*

● **Zork I, II, III.** Text lives! Three masterpieces of logic and grand adventure to revel in. Hard, logical puzzles with erudite parser that understands complete compound sentences and questions, has amazing vocabulary. I and II use standard scoring, standard goals; III has unique point system, and benevolence pays. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *Zork I, 6/81; Zork II, 3/82; Zork III, 9/82.*

Business

Accounting Plus II and **IIe.** *II* version is integrated package; general ledger, accounts receivable and payable, and inventory-purchasing modules. Menu-driven; prompting. *IIe* version is stripped and rebuilt to take advantage of available functions. Software Dimensions, 6371 Auburn Blvd., Citrus Heights, CA 95610. *II*, $1,250; *IIe*, $995.

Apple II Business Graphics. Converts numerical data into charts and graphs. Features mathematical and statistical functions. Requires 64K. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

BPI Accounting System. Popular six-module business package; programs also available separately. Includes *General Ledger* (a bestseller), accounts receivable, accounts payable, payroll, inventory control, and job costing. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $395 each; job costing, $595.

✓ **Bulk Mailer.** Marinello. Hard disk mailer handles 32,000 names, retrieves a name by account number in two seconds. Floppy disk handles 1,200 names per disk. Includes zip-code inventory, duplicate entry killer. A technical and functional advance. Satori Software, 5507 N. Woodlawn, Seattle, WA 98103. Floppy disk, $125; hard disk, $350. *6/83.*

Cdex Training for VisiCalc. Brandt. Self-contained Apple-assisted training program and reference guide for the #1 electronic spreadsheet. User-selectable information. Cdex, 5050 El Camino Rd., Los Altos, CA 94022. $49.95. *3/83.*

✓ **The Data Bank.** Garner, Flowers. Database management system for nonprogrammers. Generates mail lists; client and letter files; checkbook, student, and patient records; and recipes. FlowerSoft, 564 Tara, Manteca, CA 95336. $170.

DB Master. Comprehensive database-management system with password protection, extensive report creation options. 1,000 characters per record. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $229. *10/81.*

DB Master Utility Pak #1 and **Utility Pak #2.** Compatible with version III. Translates *DB* files to Apple text, restructures existing files, replicates and merges, and recovers crashed files. *Pak #2* includes label printer, global editor, file merge, reblocker, and forms printer. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $99 each.

General Manager. User-definable database-management system; can use one to four disk drives or hard disk. Change screen and field formats without reentering data. Current version supports IIe and 80-column card at no extra cost. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $229.95. Hard-disk version, $374.95.

The Incredible Jack. Word processor, database, and spreadsheet, plus mailing label print and sort. Gives 80-column u/lc display automatically on the IIe, with 64K, 80-column card on the II Plus. Business Solutions, 60 E. Main St., Kings Park, NY 11754. $179.

InfoStar. Hajicek, Collier, Rubinstein. Database management for nonprogrammers. Maintains updates, generates simple or customized reports. MicroPro, 33 San Pablo Ave., San Rafael, CA 94903. $495.

✓ **Invoice File.** Zornes. Template for *DB Master* generates reports sorted by invoice number, customer number, customer name, and product description. Includes instructions for creating customized reports; requires minimal knowledge of *DB Master*. Phoenix, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $89.95.

✓ **Legal Billing.** Marinello. Complete billing system for lawyers prints customized statements, aging reports. Includes trust accounts, user-designated codes, automatic interest adder. For up to 200 clients and 4,000 transactions. Satori Software, 5507 N. Woodlawn, Seattle, WA 98103. $350.

List Handler. Keary, Elekman. List-lover's delight. Prints lists, labels, and letters. Handles 3,000 records per disk and eight disk drives. Takes requests. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $89.95. *2/83.*

✓ **Magicalc.** Graves. Electronic spreadsheet with automatic page formatting and support of additional memory boards up to 512K. Compatible with *VisiCalc* and *Magic Window II*. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

Multiplan. Easy-to-learn electronic work sheet using plain-English commands. Powerful modeling and presentation capabilities. For use in analysis, forecasting, technical engineering, and the home. Versions 1.04 and up use 80 columns and extended memory on the IIe. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $275.

PFS:File. Page, Roberts. User controls data in totally unstructured database. Up to 32 pages (screens) of information in each record. IIe version has 80 columns, u/lc. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *10/80.*

PFS:Graph. Chin, Hill. Works alone or interfaces with files created with *PFS:File* and *VisiCalc*. Produces bar, line, and pie charts merging data from several sources. 80 columns and increased graphics support in IIe version. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *5/82.*

PFS:Report. Page. Powerful report generator designed for use with *PFS:File*. Sorts, calculates, totals, formats, and prints presentation-quality columnar reports. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *6/81.*

Quick File IIe. Easy-to-use personal database filing system. Fifteen fields; files as long as disk allows. IIe, two disk drives. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

Risk Simulator. Estimates probability distributions related to risk situations, such as automobile maintenance expenses or employer funding of health benefits. Actuarial Microcomputer Software, 3915 Valley Ct., Winston-Salem, NC 27106. $185.

✓ **SDM: Screen Data Manager.** Gooding. Database manager featuring custom-screen-entry formatting and report generation. Twenty-one databases (mail, invoice, libraries, inventory) with 10 reports each. The Software Mill, 19 Grist Mill Rd., Acton, MA 01720. Two disks, $49.

State of the Art General Ledger and **Budget Forecasting Module.** The ledger does 12-period accounting, two-digit subaccounts; handles up to 470 accounts; enters 100 transactions before updating to permanent files. Budget module extends account number to nine digits; custom designs reports; does previous-year comparisons. State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626. $495, budget module, $395.

VersaForm. Business-forms generator for invoicing, mailing lists, sales analysis, inventory. Hard-disk-compatible. Applied Software Technology, 14125 Capri Dr., Los Gatos, CA 95030. $389. *6/82.*

● **VisiCalc.** Bricklin, Frankston. Electronic work sheet for any problem involving numbers, rows, and

columns. No programming necessary. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250. *10/80.*
VisiFile. Creative Computer, Jameson, Herman. Database-management information system for organization and retrieval of information, allowing sort and modification of records. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.
VisiSchedule. Critical path PERT schedule planner. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $300.
VisiTrend/VisiPlot. Kapor. Combines *VisiPlot* graphics with time-series manipulation, trend forecasting, and descriptive statistics. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $259.95. *7/81.*

Communications

Apple Link. Jaffe, Pierce. Creates intelligent terminal at receiving end with no additional software. Only modem software known that can transmit *Screen-Writer* text files. Also transmits random-access text files. Computer Applications, 13300 S.W. 108 Street Circle, Miami, FL 33186. $59.95.
ASCII Express: The Professional. Robbins, Blue. Greatly improved version of original modem software package features automatic redial, individual macro files, and conversion of Integer, Applesoft, or binary programs into text files. Works with a plethora of hardware. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95. *12/82.*
Data Capture 4.0. Copyable, modifiable smart terminal program; compatible with Apple III and most lower-case adapters. Southeastern Software, 6414 Derbyshire Dr., New Orleans, LA 70126. $65.
Dow Jones Connector. Guide to the use of the company's News/Retrieval Service and Blue Chip membership, too. Dow Jones Software, Box 300, Princeton, NJ 08540. $95.
Hayes Terminal Program. Standalone disk designed for the Micromodem II lets CP/M, DOS 3.3, and Pascal disks create, list, delete, send, and receive files. Opens access to nonkeyboard ASCII characters and prints incoming data as it's displayed. Hayes Microcomputer Products, 5835 Peachtree Corners East, Norcross, GA 30092. $99.
P-Term: The Professional. Supports all Pascal-compatible interfaces, asynchronous serial cards, Apple-compatible modems, and baud rates up to 2400. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95.
TermExec. O'Neil. Turns Apple with modem into an intelligent terminal workstation. Features unattended long file capture, 300 or 1200 baud operation, back-scrolling, edited file capture of past terminal sessions from scrolling buffer, full-screen editor, macros, execs for most modems. Exec Software, 201 Waltham St., Lexington, MA 02173. $79.95.
Transend 1, 2, 3. Intelligent-terminal software with multiple hardware compatibility. Advanced, easy to use. *1* sends text only; menu-driven, limited editor. *2* sends text and files like *VisiCalc*, verifies transmission. *3* does both and handles electronic mail with automatic redial, clock calendar, and password protection. Upgrade: difference in price between two packages plus $20 service fee. SSM, 2190 Paragon Dr., San Jose, CA 95131. $89, $149, $275. *9/82.*
Z-Term: The Professional. More than an update. Compatible with a great variety of modems, interface cards, and screen modes. Simple file transfer with integrity. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $149.95.

Fantasy

Role-playing games involving characters that develop through experience in adventuresome stories, and whose actions players determine via set commands.

● **Beneath Apple Manor.** Worth. The original dungeon game for the Apple, created in 1978. Newly released version has hi-res, sound effects, a few more magic items, but still the classic game. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $29.95. *2/83.*
Knight of Diamonds. Second scenario of *Wizardry*, requiring thirteenth-level characters from the original. Individual quests on each of six dungeon levels. Great. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $34.95. *7/82.*
Legacy of Llylgamyn. Greenberg, Woodhead. Third scenario in classic *Wizardry* series. To save Llylgamyn, descendants of the adventurers of other *Wizardry* scenarios (requires *Overlord*) must wrest a mystical orb from the dragon L'kbreth. New full-screen dungeon, Lisalike information screens. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $39.95. *7/83.*
Missing Ring. Romine. Find wizard's missing ring alone or with the help of up to four independent characters. Task becomes more complex as number of players increases. Datamost, 9748 Cozycroft Ave., Chatsworth, CA 91311. $29.95. *7/83.*
● **Odyssey: The Compleat Apventure.** Clardy. Fantasy adventure far beyond one place and one setting. Castles, catacombs, an ocean voyage, and the orb of power. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $30. *10/80.*
● **Temple of Apshai.** Lead title in *Dunjonquest* series, winner 1981 Academy of Adventure Gaming Arts and Design "Computer Game of the Year" award. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $39.95.
● **Ultima.** British. Hi-res color adventure, progressing from Middle Ages to beyond the space age. A masterpiece. California Pacific, 1623 5th St., Davis, CA 95616. $39.95. *6/81.*
Ultima II. British. Faster play in a bigger universe with a time-travel option. Typically British look and feel. Events are much more interdependent; larger realm of fantasy with more transactions available. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $59.95.
● **Wilderness Campaign.** Clardy. First fantasy game to leave the dungeon for the great outdoors; first in hi-res; first to bargain with merchants; and more. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $17.50.
● **Wizardry.** Greenberg, Woodhead. Ultimate role-playing fantasy; ten-level maze in hi-res. Generate 20 characters, six at a time on expeditions. Gripping game; superbly reproduced. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $49.95. *8/81.*

Graphics

Alpha Plot. Kersey, Cassidy. Hi-res graphics and text utility with optional xdraw cursor and proportional spacing. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $39.50.
The Complete Graphics System. Pelczarski. A wealth of graphics tools at a reasonable price. Make 2-D drawings with game paddles, add text in destructive, nondestructive, or reverse modes; create 3-D figures and shape tables. Manual features complete outline of command structure. Penguin, 830 4th Ave., Geneva, IL 60134. $69.95; Apple Graphics Tablet version, $119.95. *7/81.*
Fontrix. Boker, Houston. Character generator creates unlimited number of typefaces, uses them to write on a screen extended 16 times. Extremely significant development in graphics. Data Transforms, 616 Washington St., #106, Denver, CO 80203. $75. *7/83.*
The Graphics Magician. Jochumson, Lubar, Pelczarski. Outstanding animation package consisting of picture editor and shape-table extender. Comes with utility program to transfer binary files. Penguin, 830 4th Ave., Geneva, IL 60134. $59.95; Apple Graphics Tablet version, $69.95. *5/82.*
LPS II. Superb hi-res-graphics drawing system with light pen. Draw freehand or use circles and lines to create geometric shapes. Fill routine with colors and patterns; fun animation demo; programmable Pentrak driver. Gibson, 23192-D Verdugo Dr., Laguna Hills, CA 92653. $349. *10/82.*
✔ **Scientific Plotter, Version II.** Warme. Plots lab results as line graphs. Choose data format, length and position of axes, error bars; labels anywhere in four orientations. Has standalone utility for creation of slides and transparencies that allows printing of labels on any hi-res picture. Includes five demos, manual. Interactive Microware, Box 771, State College, PA 16801. $25.
Zoom Grafix. Holle. Graphics-printing utility allows display of picture on-screen prior to print; prints out selected portion at any size. Phoenix, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $39.95. *2/82.*

Home

The Accountant. Forman. Simple-to-use double-entry finance system features seven integrated files and a set of automatic transactions. A sleeper just beginning to get wider distribution. Decision Support, 1438 Ironwood Dr., McLean, VA 22101. $129.95. *1/82.*
Bowling Data System. Data Dynamics. Two-disk record-keeping and report-preparation program for infinite number of leagues, up to 40 teams. Weekly recap, season average, more. Rainbow Computing, 9719 Reseda Blvd., Northridge, CA 91324. $149.95.
● **Crossword Magic.** Crossword puzzle maker. Choose subject, words, and clues; program automatically connects words. Play on-screen or make printout. L&S Computerware, 1589 Fraser Dr., Sunnyvale, CA 94087. $49.95.
Dow Jones Market Analyzer (formerly *RTR Market Analyzer*). Automatically collects, stores, and updates historical and daily market quotes. Provides technical analysis in addition to plotting 18 different types of charts. Dow Jones Software, Box 300, Princeton, NJ 08540. $350.
✔ **Einstein MemoryTrainer.** Rubin, Samet. Interactive tutorial with color graphics and gamelike practice sessions teaches methods for remembering names, faces, phone numbers, dates, and lists. Set your own pace; store personal memory techniques. Three disks, user guide included. Einstein, 11340 W. Olympic Blvd., Los Angeles, CA 90064. $89.95.
Family Roots. Professional genealogy database with unlimited-records capability. Unprotected; works with 80-column and u/lc. Extensive documentation. Quinsept, Box 216, Lexington, MA 02173. $185.
✔ **Golf League Statistics.** McQuinn. Manages, displays, and prints golf league statistics for up to 50 players and 20 teams. Tracks more than 100 statistics for each player in league. Disk Depot, 731 W. Colorado Ave., Colorado Springs, CO 80905. $139.95.
Golf Statistician. Haberle. Helps golfers lower their scores by examining their strengths and weaknesses. GolfSoft, 10333 Balsam Ln., Eden Prairie, MN 55344. $34.95.
Hi-Res Versatile Calculator. Tackaberry. Transforms computer into scientific calculator that performs functions in four bases and converts between them. Features ASCII code display and four stack registers. Tackaberry Software, Box 2857, Ormond Beach, FL 32074. $59.95.
Home Accountant. Schoenburg. Thorough, powerful home finance program. Monitors five checking accounts against a common budget, plus credit cards and cash; one-step record or transfer of funds. Continental, 11223 S. Hindry Ave., Los Angeles, CA 90045. $74.95. *4/82.*
Know Your Apple, Apple IIe. Visually oriented computer tutorials with manuals. Cover disks, drives, and peripherals. Models of clarity. Muse, 347 N. Charles St., Baltimore, MD 21201. *Know Your Apple*, $34.95;

NOAH WEBSTER, MEET YOUR MATCH.

A few months ago, Jennifer would rather have gone to the dentist than do her spelling homework.

Then Mom bought Crypto Cube™ by DesignWare.™ Now Jennifer has become a word fiend. In fact, she spends hours paging through the dictionary to find words that will stump her parents. And, as she does, she builds her word skills.

Crypto Cube, like all DesignWare software products, combine computer game fun with sound educational principles.

THE THREE DIMENSIONAL COMPUTER WORD PUZZLE.

Five minutes after Jennifer sat down at the computer with Crypto Cube, she was hooked. First she worked her way through the many word puzzles that come with the game. Then her parents typed her spelling homework into new puzzles.

Then Jennifer started making puzzles for her parents!

So now, Crypto Cube is the favorite family game in Jennifer's home.

As Jennifer would say, "indubitably."

DESIGNWARE MAKES LEARNING COME ALIVE.

If you own an Apple][plus, Apple //e IBM-PC, Atari 400, 800, or 1200XL with a disk drive, you should take a close look at all the DesignWare software.

Another word game, Spellicopter,™ is an action-packed spelling game. You'll fly perilous missions through crowded skies and mountainous terrain to rescue words. And you'll want to keep an eye out for our new math and science games. See your local dealer or call DesignWare at (800) 572-7767, in California (415) 546-1866 for our free software catalog. You'll be delighted with the way your kids will learn with DesignWare.

And they'll be playing for the fun of it.

DesignWare™

LEARNING COMES ALIVE.

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Know Your Apple IIe, $24.95. *Know Your Apple, 3/83.*

Micro Cookbook. Recipe-management system allows entry and modification; selection of recipes by common ingredients, name, or classification. Calorie and nutrition guide. Virtual Combinatics, Box 755, Rockport, MD 01966. $40. *6/83.*

Money Street. Payne. Does accounting, collects data, and balances an unlimited number of checkbooks. 100 user-defined categories, 13 reports. Computer Tax Service, Box 4845, Incline Village, NV 89450. $99.95.

✓ **NFL Scoreboard.** Football pointspread prediction system gives probable scores, team performance summary, divisional standings, and season play-off predictions. Can be used season after season. Micro Data, 741 Surrey Dr., Streamwood, IL 60103. $49.95.

Personal Finance Manager. Gold, Software Dimensions. Handles 200 entries a month from 14 separate accounts. Search-sort-enter routine. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $75. *11/81.*

Power of Words. Funk. Ten interactive word games by the author of the *Reader's Digest*'s "It Pays To Enrich Your Word Power." Humor, graphics, auditory clues demonstrate words and reinforce memory. Funk Vocab-Ware, 4825 Province Line Rd., Princeton, NJ 08540. Two disks, $49.95. *7/83.*

ThinkTank. Idea processor program allows you to see ideas in outline form. Outline can be collapsed to see the big picture or expanded to reveal hidden details. Living Video Text, 450 San Antonio Rd., #56, Palo Alto, CA 94306. $150.

Home-Arcade

Fast-action skill games; may include elements of fantasy.

A.E. Horai. Blast away like mad in 3-D. Time the release and detonation of missiles and repel the next wave. Innovative graphics, new firing technique, and fugues to boot. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *2/83.*

● **Alien Rain**. Suzuki. Monsters in this classic seem to take it personally when you gun down one of their own kind. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/81.*

● **Apple Panic.** Serki. Rid a five-story building of crawling apples and butterflies by running up and down connecting ladders, digging traps, then covering critters before they devour you. Extremely addictive, excellent hi-res play. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *9/81.*

The Arcade Machine. Jochumson, Carlston. Step-by-step arcade-game designer—shapes, scoring, sound, and titles. Begin with variations on five games included, then on to your own. Broderbund, 1938 4th St., San Rafael, CA 94901. $59.95. *11/82.*

Aztec. Stephenson. Graphic fantasy arcade with animation throughout. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95. *1/83.*

Beagle Bag. Kersey. Twenty games and miscellany, written in Basic and unprotected. Great humor, good two-player games. Manual is worth the price of admission. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50. *1/83.*

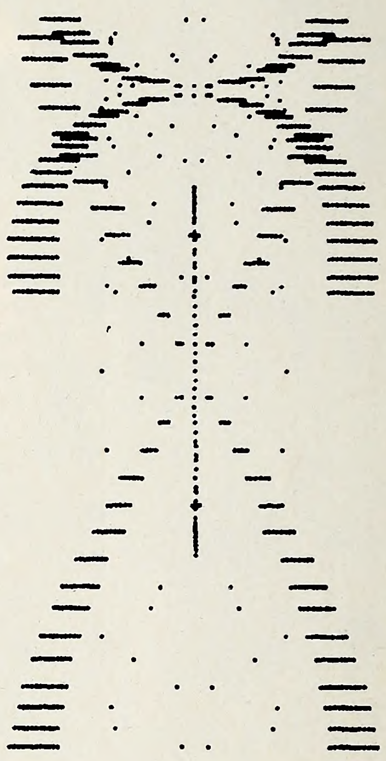
Bolo. Micro version of sci-fi fantasy. Huge maze where you don't eat anything. Drive around in tank and destroy enemy bases as you're dogged by intelligent assassin tanks. Much depth, many months' fun. Top class. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $34.85. *2/83.*

● **Choplifter.** Gorlin. Fly your chopper to rescue 64 hostages, avoiding interceptor jets, homing mines, and tanks. Challenging, realistic, and playful. Stunning graphics. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95. *7/82.*

Crime Wave. Your beat: the city. Bank robbers strike; can you catch them? Metropolitan chase-'em-up on city streets or at the scene of the crime. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95. *4/83.*

Crisis Mountain. Schroeder. Run, crawl, walk, and leap through mountain maze fraught with rolling rocks, geysers, and chasms; defuse nuclear devices. Synergistic, 830 N. Riverside Dr., #210, Renton, WA 98055. $34.95. *10/82.*

● **Crossfire.** Sullivan. Aliens come at you from four directions on a grid laid out like city blocks. Strategy and intense concentration required. Superb, smooth animation of a dozen pieces simultaneously. One of the great ones. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95. *1/82.*



Printouts by Benedict Drda

● **Epoch.** Miller. Superbly stylized animation enhances this filmic shoot-'em-up. Tremendous sense of being in space; neat classical music and dramatic time-warp sequences. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95. *10/81.*

Frogger. Lubeck. Doesn't resemble the coin-op game of the same name, but not a bad little game in its own way. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95. *12/82.*

● **Gorgon.** Nasir. Fly over planet shooting and dodging invaders and saving kidnapped inhabitants. Outstanding hi-res graphics, challenging refueling sequence. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *8/81.*

Hard Hat Mack. Abbott, Alexander. Poor Mack. He must avoid vandals, inspectors, falling rivets, and hungry cement mixers to complete his building. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35. *7/83.*

✓ **Highrise.** Calabrese. Hard-hat Barnaby needs a keen eye for balance as he uses a springboard to stack oddly shaped blocks and build his skyscraper. Includes a nontiming, nonscoring learning mode. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $30. *5/83.*

Jump Jet. Benton. Twenty tons of thrust separate you from torpedoes, submarines, and kamikaze planes. Vanquish all to recapture your island. Avant-Garde Creations, Box 30160, Eugene, OR 97403. $29.95.


EXODUS
ULTIMA III

Lode Runner. Smith. One hundred fifty unique levels in super run-climb-dig-jump game—or design your own puzzles, scenes, and setups—in quest to retrieve stolen gold from the Bungeling Empire. Use tightropes, trapdoors, and ladders to your advantage. Broderbund, 1938 4th St., San Rafael, CA 94901. $34.95.

Mating Zone. Luhrs. Harmless aliens bounce and breed, raining destruction. Strive for space-invading zero-population growth. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95.

Maze Craze Construction Set. Hammond. Play their mazes or construct your own. Two can enter the same maze. DTI Data Trek, 121 West E St., Encinitas, CA 92024. $39.95.

● **Meteoroids (Asteroids) in Space.** Wallace. Make little asteroids out of big ones, plus occasional hostile alien ships. Hyperspace, autobrake, autofire. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $19.95.

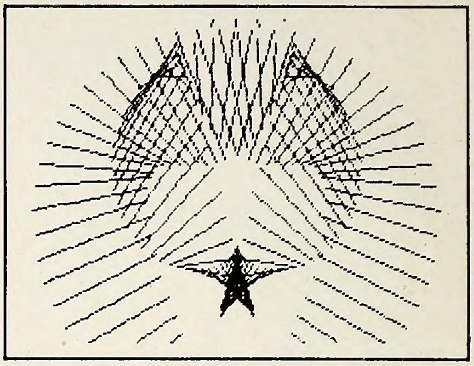
● **Microsoft Decathlon** (formerly *Olympic Decathlon*). Smith. Ten standard decathlon events. Hi-res animated athletes, muscle-stirring music; you provide the sweat. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $29.95. *6/81.*

Miner 2049er. Livesay, Hogue. Run, jump, climb, and slide through the mines, reinforcing the groundwork along the way. Elevators, cannons, chutes, and ladders help; mutants don't. Hot stuff, best of the genre. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $39.95. *1/83.*

Pentapus. Sagan. A giant purple octopus threatens the universe. Destroy it on adult or child's level. Turning Point Software, 11A Main St., Watertown, MA 02172. $29.95. *7/83.*

Pie Man. Berns, Kosaka. I Love Lucy classic scene with the pies and conveyor belt, immortalized in hi-res. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95. *10/82.*

Pinball Construction Set. Budge. Design and play your own computer games on-screen, with zero programming. A miracle of rare device. Superior. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $39.95. *2/83.*



Plasmania. Lubar. Shoot your way past antibodies and bacteria as you take a fantastic voyage through the veins of a critically ill patient. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95.

● **Pool 1.5.** Hoffman, St. Germain, Morock. Makes most shots you could on a real pool table, with the advantages of instant replay and slow motion. Four different games. IDSI, Box 1658, Las Cruces, NM 88004. $34.95. *6/81.*

● **Raster Blaster.** Budge. First realistic pinball game. *Softalk* readers' Most Popular Program of 1981. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $29.95. *5/81.*

Repton. Thompson, Kaluzniacki. The *ne plus ultra* of planet-defending, in the *Defender* style, plus. Top flight all the way. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *1/83.*

Sammy Lightfoot. Schwader. Sammy must dodge a variety of obstacles as he tries out for the circus. He evidently used to be a miner. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95.

Sea Dragon. Anderson. Talking tunnel endurance test in which a variety of underwater nasties try to keep player from freeing the little sea serpent. Adventure International, Box 3435 Longwood, FL 32750. $34.95. *1/83.*

Seafox. A good sub-versus-convoy home arcader. Variety of vessels, bouncing torpedoes, refueling dolphins, and intelligent depth charges. Broderbund, 1938 4th St., San Rafael, CA 94901. $29.95. *11/82.*

Serpentine. Hypnotic snake-chase maze game. Clean action, thrills, hairy escapes. Recommended. Broderbund, 1938 4th Ave., San Rafael, CA 94901. $34.95. *10/82.*

● **Sneakers.** Turmell. Many-layered shooting game; one of the best. Stomping sneakers and other creatures requires varying techniques. Fun. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *9/81.*

Spectre. Flanagan, Miller. Marooned on a deserted space station, you must conquer confusing mazes to outrun the invading Questors. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95. *6/83.*

Spy's Demise. Zeldin, Hardy. Be the first on your block to run a maze of pile-driving elevators. Fast, frustrating fun. Complete puzzle after all nine levels. Penguin, 830 4th Ave., Geneva, IL 60134. $29.95. *11/82.*

Star Blazer. Suzuki. Bomb-run game with five levels, minutely exact animation, and style to burn. A joy. Broderbund, 1938 4th St., San Rafael, CA 94901. $31.95. *4/82.*

● **Super Invader.** Hata. Progenitor of home arcades. Still good hi-res, still a challenge. *Softalk* readers' Most Popular Program of 1978-80. Astar International, through California Pacific, 1615 5th St., Davis, CA 95616, and Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07960. $19.95.

Super Taxman 2. Fitzgerald. Pac up your troubles! Bigger, more complex version of the most perfect extant rendition of a certain arcade game. H.A.L. Labs, 4074 Midland Rd., #23, Riverside, CA

92505. $25. *1/83.*

Thunderbombs. Becklund. You'll need two sets of eyes, hands, and reflexes to survive this one. Your cloudship is under bilateral attack, and it's just you and your bilateral lightning torpedoes. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95.

Vindicator. Huey. Mutants, vultures, hatchlings, and other lovelies try to steal eggs in Robotronlike game. Cute dragons. H.A.L. Labs, 4074 Midland Rd., #23, Riverside, CA 92505. $25.

● **Wayout.** Exciting 3-D maze that moves in perspective as you play. Map displayed at all times. Lots of angles and cleptangles. Separate version for IIe. Exquisite motion animation is a breakthrough. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *10/82.*

✓ **Zaxxon.** Garcia. Legendary 3-D scrolling air raid brought to the Apple with little sacrifice in playability. Datasoft, 16606 Schoenborn St., Sepulveda, CA 91348. $39.95.

Home Education

Algebra 1-4. Sets of learning units progressing from algebraic rules to definitions to graphing and inequalities. Individualized teaching styles to fit everyone's needs. Good for adults wanting to overcome math anxiety as well as for schoolkids. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95 each.

Apple Logo. Papert. Custom version (by its inventor) of turtle graphics language. First-rate educational tool. Great kid-friendly documentation. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Arcademic Skill Builders in Language Arts. Victor. Eight programs and audio cassette help students and adults overcome spelling difficulties while teaching them a method of approaching difficult words. Program Design, 11 Idar Ct., Greenwich, CT 06830. $26.95.

✓ **Arithmetic Skills.** Helps children establish a strong foundation in basic math skills, computer literacy. Covers counting, addition, subtraction, multiplication, and division. Pass-fail ratios can be parent-defined. Edu-Ware, Box 22222, Agoura, CA 91301. $49.95.

Computer SAT. Prepares college-bound student for admittance test. Diagnoses strengths, weaknesses; creates study plan, exercises. Harcourt Brace Jovanovich, 1250 6th Ave., San Diego, CA 92101. $79.95.

Delta Drawing. Kids can make colorful drawings by using single-key commands. No special talent needed; this one develops programs that create complex graphics. Spinnaker, 215 1st St., Cambridge, MA 02142. $59.95. *11/82.*

Early Games for Young Children. Paulson. Basic training in numbers, letters, Apple keyboard for children ages two to seven with no adult supervision. Has a neat little drawing program. Counterpoint Software, Shelard Plaza N., #140, Minneapolis, MN 55426. $29.95. *11/82.*

Early Games Music. Paulson. Illustrates music with fun and theory. Children compose music and set to graphics or learn note reading and piano keyboard. Counterpoint Software, Shelard Plaza N., #140, Minneapolis, MN 55426. $29.95.

Ernie's Quiz. CTW. Four games, four subjects, one disk. Image recognition, counting skills, creativity, and Muppet expertise are introduced with lots of positive feedback. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83.*

Facemaker. DesignWare. Exercises kids' creativity and introduces programlike command sequencing as kids create faces and link them together in animated patterns. Spinnaker, 215 1st St., Cambridge, MA 02142. $34.95.

Fact or Opinion. Savitsky, Savitsky. Helps students identify difference between fact and opinion in advertising and situations encountered daily. Could help next time the kids beg for E.T. toothpaste or chocolate greasy-whizzies. Learning Well, 200 S. Service Rd., Roslyn Heights, NY 11577. $49.95.

Following Directions. Savitsky, Savitsky. Teaches reading comprehension and the sequential following of directions. Two to six players. Learning Well, 200 S. Service Rd., Roslyn Heights, NY 11577. $49.95.

Fractions. Hi-res addition, subtraction, multiplication, and division of fractions. With learning manager system. Edu-Ware, Box 22222, Agoura, CA 91301. $49.

Game Show. Guess mystery words from clues given by "celebrity" partners—no threat to Liz Montgomery. Fifteen subjects cover vocabulary, history, algebra, and more. Add topics. Computer-Advanced Ideas, 1442A Walnut St., #341M, Berkeley, CA 94709. $39.

Gertrude's Secrets. Gertrude the Goose teaches four-to-nine-year-olds shape and color relationships. Solve logic puzzles, create forms. The Learning Co., 4370 Alpine Rd., Portola Valley, CA 94025. $49.95. *2/83.*

Hey Diddle Diddle. Disharoon. Three reading and vocabulary games that strengthen reasoning ability. Ages 3 to 10. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

✓ **In Search of the Most Amazing Thing.** Snyder. Peaceable adventure lets kids negotiate with aliens instead of blasting them. Package includes a novel. Ages 10 to adult. Spinnaker, 215 1st St., Cambridge, MA 02142. $44.95. *7/83.*

Instant Zoo. CTW. Identify animals, test perception and reaction, match and decode words. Word editor lets you create your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

Kindercomp. Learning exercises for ages three through eight. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

Latin Hangman. Protelsch. Three games test your knowledge of Latin. Famous sayings, English-Latin, Latin-English translations. George Earl, 1302 S. General McMullen, San Antonio, TX 78237. Two-sided disk, $29.95.

Learning about Numbers. Clark, Cornelius. Three games teach children basic math skills, counting, and how to tell time. Includes special feature for prereaders. C&C Software, 5713 Kentford Circle, Wichita, KS 67220. $40.

Learning with Leeper. Anderton. Four preschool games teach eye-hand coordination, shape matching, and counting. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95.

● **MasterType.** Zweig. Learn to type by playing a game; simple and ingenious. IIe version teaches new keyboard. Lightning, Box 11725, Palo Alto, CA 94306. $39.95. *4/81.*

✓ **Micro Math Magic.** Courseware series instructs students in basic math, decimals, rounding, fractions, making change, geometry, and word problems. Reinforces immediately, gives score and time taken to solve problem. Deegan Learning Materials, Box 245, Mankato, MN 56001. $32.95, disk; set of 12, $395.40.

Mix and Match. CTW. Create mixed-up Muppets and teach the Apple about animals. Logic and word-guessing games. Add your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83.*

Multiploy. Coletta. From answer base, blast menacing arithmetic problems out of the sky. Ranks and scores kept for tracking progress. Reston Publishing, 11480 Sunset Hills Rd., Reston, VA 22090. $19.95.

● **The New Step by Step.** Software and audio tape team up to teach Basic programming painlessly. Graphics, animation, sound effects, and workbook. Superior. Program Design, 11 Idar Ct., Greenwich, CT 06830. $79.95. *7/82.*

✓ **On Becoming a Hero.** Nidorf. Nonjudgmental program for teenagers helps them evaluate their value system, decide what kind of person they are and what kind of person they want to be. Psychological Psoftware, 4757 Sun Valley Rd., Del Mar, CA 92014. $29.50.

✓ **Plato High School Skills.** Helps high-school-level students master reading, English, math, social studies,

and science. Can assist students preparing for the G.E.D. exams. Control Data, Box 261127, San Diego, CA 92126. Each lesson, $45.

Police Artist. Levin. Pick the culprit out of a lineup or rebuild the culprit's face from memory. Three games can create a million faces. Ages seven to adult. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $34.95. *6/83.*

PSAT Word Attack Skills. Priven. Teaches vocabulary and techniques for deciphering unfamiliar words in pressurized testing situation. Edu-Ware, Box 22222, Agoura, CA 91301. $49.

Rhymes and Riddles. Cross. Four games to teach reading and spelling to elementary schoolchildren. Fill in the blanks with the necessary phrase. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

Rocky's Boots. Rascally racoon helps children build logical thinking and computer understanding. Construct machines of logical gates in convolutions of thickening complexity. Music and sound effects add to fun. The Learning Co., 4370 Alpine Rd., Portola Valley, CA 94025. $49.95. *2/83.*

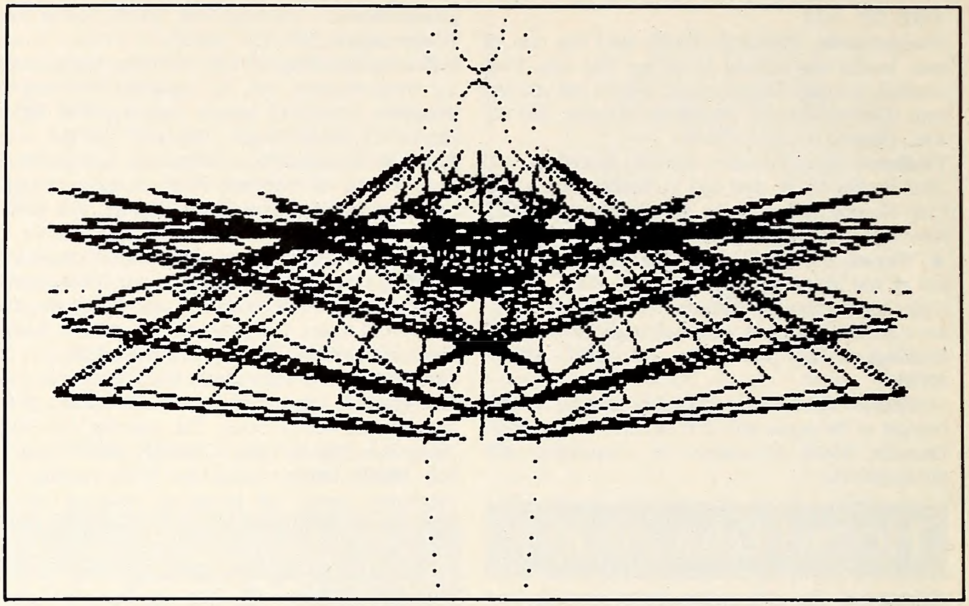
SAT English I. Designed to help high school students prepare for college entrance exam. Covers verbal half of test; learn by mistakes. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $30. *11/81.*

Snooper Troops. Snyder. Ongoing hi-res mystery series in form of educational games. Highly structured; excellent fourth-through-eighth-grade educational tool. Fun for adults too. Spinnaker, 215 1st St., Cambridge, MA 02142. $44.95 each. *9/82.*

Speed Reading. Coad. Self-teaching program accommodates 20 readers; tests, records their progress. Can use your own reading material. BPI Systems, 3423 Guadalupe, Austin, TX 78705. $195.

Spelling Bee Games. Hi-res games strengthen eye-hand coordination, memory, motor skills. Word lists include shapes, animals, more. Edu-Ware, Box 22222, Agoura, CA 91301. $29.95. *5/83.*

Spelling Builder. Victor. Unique set of eight programs and audio cassette teaches students and adults reasons behind spelling; overcomes spelling difficulties. Ideal for those who have mastered basic spelling but have trouble with tricky words. Superior. Program Design, 11 Idar Ct., Greenwich, CT 06830. $26.95.



Spotlight. CTW. Simple geometry for preteens. Games involve number estimation and angles of reflection. Good and fun. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50.

Step by Step Two. Introduces graduates of *The New Step by Step* to intermediate Basic programming. Teaches peek and poke, hexadecimal numbers, concatenations, and more. Program Design, 11 Idar Ct., Greenwich, CT 06830. $89.95. *7/83.*

Stickybear. Hefter, Worthington, Rice. Animated early education programs. In *Stickybear ABC*, moving pictures with sound represent letters. In *Stickybear Numbers*, groups of moving objects teach numbers and simple arithmetic. Ages three through six. In *Stickybear Bop*, ducks, planets, and balloons bop across screen in three shooting galleries. For all ages. Xerox Education/Weekly Reader, 245 Long Hill Rd., Middletown, CT 06457. $39.95 each. *5/83.*

Story Machine. Helps develop positive attitude toward writing and ability to write correctly. Words come to life when sentence is acted out on-screen. Kids five to nine love to type "The tree ran down the street" and see it do so. Spinnaker, 215 1st St., Cambridge, MA 02142. $34.95.

Tic Tac Show. Teaches facts and concepts about the world in general. Solo or double play; add topics. Computer-Advanced Ideas, 1442A Walnut St., Berkeley, CA 94709. $39.95.

Troll's Tale. Lowe, MacChesney. Kids must find the treasures taken by the terrible troll and restore them to the dwarf king. Third-grade reading level. A delight. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95. *5/83.*

Type Attack. Hauser. Learn to type while defending the planet Lexicon from invaders. IIe version teaches IIe keyboard. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95.

Typing Tutor. Ainsworth, Baker. Four levels of proficiency; individualized drills created with time-response monitoring. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $24.95.

Strategy

Thinking, planning, plotting games, from war games to backgammon to cards.

AirSim-1. Machine language flight simulator with six landing fields and optional instrument flying mode. Mind Systems, Box 506, Northampton, MA 01061. $40.

Casino. Five hi-res games, Vegas style: blackjack, baccarat, keno, poker, and roulette. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $39.95.

● **Castle Wolfenstein.** Warner. First game to fuse successfully strategy, home-arcade, fantasy. Escape from Nazi stronghold with secret plans. Room layout changes with each new game. Enemy speaks (in German). Muse, 347 N. Charles St., Baltimore, MD 21201. $29.95. *10/81.*

Caves of Olympus. Noone, Noone. Your planet is overrun and the only escape is through a subterranean chamber of horrors. Outwit the robotic overseer, avoid

death traps to get to the other side. Howard W. Sams, 4300 W. 62nd St., Indianapolis, IN 46268. $39.95. *6/83.*

● **Computer Ambush.** Williger. Gutty soldier-to-soldier street fighting in World War II France. Latest version is 40 times faster than the original, which was one of best games ever created for Apple, except for slowness. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95.

● **Computer Baseball.** Merrow, Avery. Simulates individual player abilities from the teams of 13 famous World Series. Enter and play teams of your own creation. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95. *9/81.*

Cosmic Balance. Murray.Design your own ships and create your own space fleet. Tactical space game that's fast and easy to play. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95. *11/82.*

Delta Squadron. Louie. To destroy Cetusites' main power source, direct fighter planes down a long, narrow tunnel in this space-war simulation. Nine scenarios. Nexa, Box 26468, San Francisco, CA 94126. $39.95. *7/83.*

Fighter Command. Merrow, Avery. Rewrite or relive famous aerial Battle of Britain as either the British or German commander. Play entire campaign or choose from three shorter scenarios. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95. *7/83.*

● **Flight Simulator.** Artwick. Uses aerodynamic equations, airfoil characteristics for realistic takeoff, flight, and landing. Two years on Top Thirty. SubLogic, 713 Edgebrook Dr., Champaign, IL 61820. $33.50.

✓ **Galaxy Space War 1.** Tarkany. Space-war simulation with two modes. Total knowledge reveals all about opponent's fleet, sensor knowledge gives only information detected by ship's probes. Galaxy, Box 22072, San Diego, CA 92122. $39.95.

Gin Rummy. Carpet. Play against computer. Hi-res hand can be arranged. Knocking allowed. Computer plays pretty well. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $29.95. *6/82.*

Hi-Res Computer Golf 2. A masterpiece; requires judgment, strategy, and visual acuity. One of the few computer sports simulations that require dexterity. Avant-Garde, Box 30160, Eugene, OR 97403. $34.95. *6/83.*

Knights of the Desert. Kroegel, Landrey, Walker. Re-creation of Rommel's World War II drive into North Africa. Struggle to take the Suez as Rommel or to push him back as the British commander. Solitaire play possible. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $39.95.

● **Microgammon II.** Program for play, practice, improvement of backgammon skills. Pretty good competition. Softape, 5547 Satsuma Ave., North Hollywood, CA 91601. $19.95. *2/81.*

✓ **North Atlantic '86.** Grigsby. The Soviet Union has seized Europe. NATO has retreated to Iceland. Desperate land-sea-air strategy for one or two players. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $59.95.

Pensate. Besnard. Chess-type thinking game with new tactics. Computer's many pieces move in relation to player's piece; each of 10 types of computer piece has unique rules. Makes full use of computer capabilities. Intriguing, progressive—and addictive. Penguin, 830 4th Ave., Geneva, IL 60134. $19.95. *7/83.*

Planetmaster. Cuba. Complex ecological simulation requires player to select six alien endangered species for nurturing. Watchfulness and planning required to protect your animals in an unpredictable environment. Magnetic Harvest, Box 255, Hopkins, SC 29061. $24.95.

Program X, The Ultimate Puzzle. Gips. The program captured on an alien spacecraft has already stumped NASA and the CIA. Now you are called in to decipher it. National Software, Box 686, Dover, MA 02030. $29.

THE CRITICS' CHOICE

"Once use of the joystick and concept of matching is understood (in Learning with Leeper), a pre-reader can use these programs with little or no intervention. The joy of discovery learning in "Screen Painting" and the solid counting, shape and letter recognition skills developed in other programs make this one of the very best pre-reading programs on the market today."

— Bud Hagen, Editor, "Closing the Gap," an educational journal.

". . . A positive learning environment, one that young computer users will flourish in."

— Softalk magazine, February 1983

"I learned a lot and it was fun."

— Rori, age 6

"These programs are great for my students...their reading skills are being improved...and they don't need keyboard skills to make the programs work."

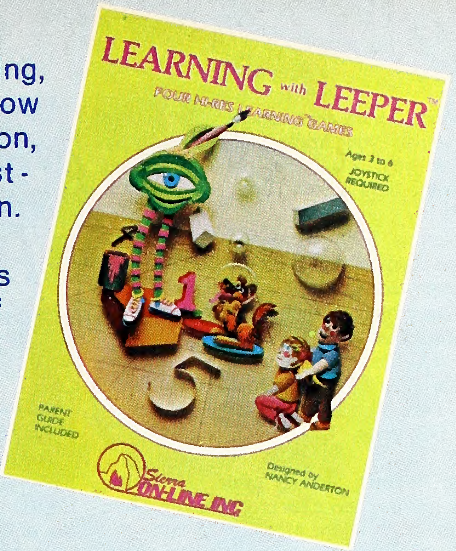
— Amy English, 3rd grade teacher

"At last I can buy games for my kids that really teach something."

— Marilyn Vartabedian, parent

HI-RES LEARNING™

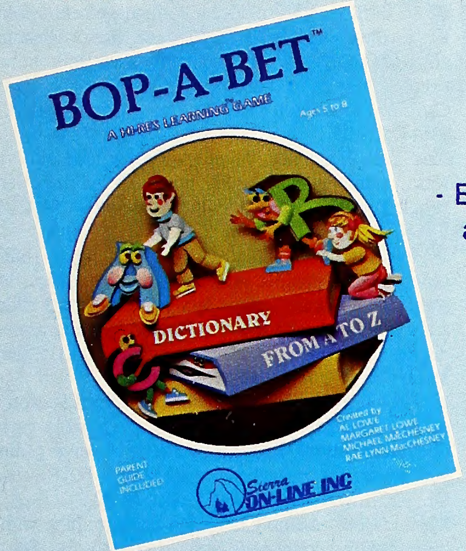
Children don't hold back. If they like something, you'll know it. If they don't- well, you'll know that, too. When it comes to children's education, parents and teachers are just as honest - it's love or loathe, no in between.



That's why Hi-Res Learning ™ games by Sierra On-Line, an assortment of challenging workouts in basic skills, are earning high marks from children, parents and teachers alike.

Learning with Leeper™
A CES Showcase selection

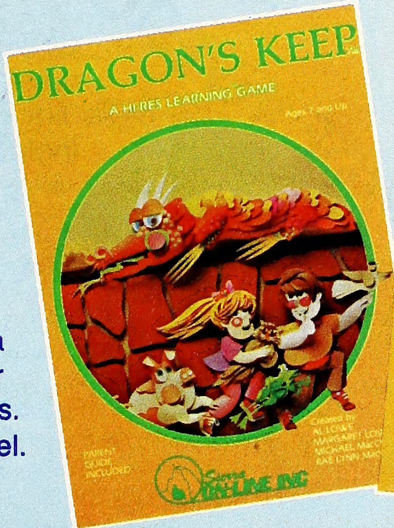
At Sierra On-Line, we think basic skills and fun deserve equal billing. Learning with Leeper,™ four games for preschool children that teach reading, writing and math readiness, reflects that belief.

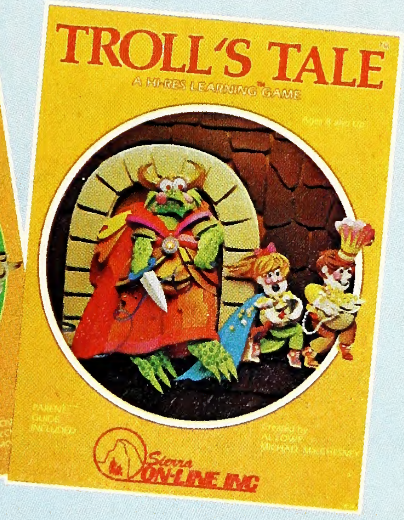


- Bop-A-Bet,™ a maze game that teaches alphabetical sequence, prepares children to use dictionaries, libraries and encyclopedias.

- Dragon's Keep™ and Troll's Tale™: Two enchanting adventure games with controlled vocabularies that emphasize reading comprehension and map skills.

Dragon's Keep,™ a journey into dragon territory to rescue animals, can be played without supervision by any youngster who can read at second grade level.





Troll's Tale,™ is a search through a fantasy land for hidden treasures. Third grade level.

Children love us for the fun and the challenge; parents and teachers love us for the head start children receive.

Ask for Hi-Res Learning™ games at your local computer store.

GAMES from Sierra ON-LINE INC

SIERRA ON-LINE BUILDING COARSEGOLD CA 93614
209 683 6858

TM designates a trademark of Sierra On-Line, Inc.

Pro Poker. Allen. Hi-res eight-handed poker tutorial between just you and your Apple in kibitz mode. Plays 300 hands per hour; California poker club rules. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $39.95.

RDF 1985. Keating. Soviet forces seize Saudi Arabia and the United States must respond in second game of "When Superpowers Collide" series. One or two players. Strategic Simulations, 883 Stierlin Rd., A-200, Mountain View, CA 94043. $34.95. *7/83.*

Rendezvous. Huntress. Space-shuttle simulation in 3-D, created by a senior scientist at JPL. Orbit Earth, match orbit, and dock with space station. Authentic, demanding. Edu-Ware, Box 22222, Agoura, CA 91301. $39.95. *7/82.*

● **RobotWar.** Warner. Strategy game with battling robots is great teaching device for programming. Muse, 347 N. Charles St., Baltimore, MD 21201. $39.95.

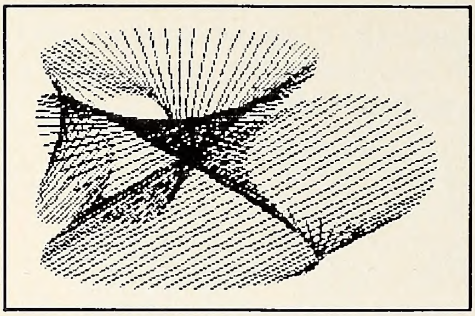
● **Sargon II.** Spracklen, Spracklen. Computer chess game with seven levels of play. Hayden, 50 Essex St., Rochelle Park, NJ 07662. $34.95.

Utility

Apple-Cillin. Hardware diagnostic tests for all RAM and ROM, plug-in cards, cp registers, disks; nine video test patterns. XPS, 323 York Rd., Carlisle, PA 17013. $49.95.

Apple Mechanic. Kersey. Multiple disk utility with shape editor, custom typefonts, byte rewriter, and tricks to facilitate music, text, and hi-res generation. Beagle Bros, 4315 Sierra Vista, San Diego, CA $29.50. *9/82.*

Apple Pascal. Structured operating system featuring enhancements of color graphics, sound generation, and Apple's I/O features. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $495.



Audex. Collection of utilities to create, edit, and play back sounds, in Basic and assembly language. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95.

Bag of Tricks. Worth, Lechner. Four utility programs for dumping and examining raw tracks, sector editing, reformatting tracks, and repairing damaged catalogs. Indispensable. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $39.95.

Bug Byter. Screen-oriented mnemonic debugging tool with resident assembler and disassembler. Displays contents of accumulator, X and Y registers. Computer-Advanced Ideas, 1442A Walnut St., #431, Berkeley, CA 94709. $47.50. *3/83.*

✓ **David-DOS.** Weston. High-speed utility adds 10K additional memory to Apple, supports ROM card. Includes variable-speed scrolling, single-keystroke catalog, and catalog abort. Copyable. David Data, 12021 Wilshire Blvd., #212C, Los Angeles, CA 90025. $39.95.

✓ **Diversi-DOS.** Basham. Well-documented, copyable program speeds up disk access, buffers keyboard input. Can be placed on RAM card; sets up RAM card as print buffer. DSR, 5848 Crampton Ct., Rockford, IL 61111. $25. *5/83.*

DOS Boss. Kersey, Cassidy. Utility to change DOS commands; customize catalog. Good ideas and witty presentation. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $24. *10/81.*

DOS Tool Kit. Excellent utility package; Apple II assembler-editor system and Applesoft toolkit. Edit, assemble machine language programs; write, edit Basic programs. Simplifies graphics, includes character generator. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $75. *10/81.*

Double Take. Simonsen. Multiple-utility features two-way scrolling for catalogs, hex/ASCII dumps. Improved list format. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $34.95.

Einstein Compiler. Goodrow, Einstein. Translates Applesoft programs into machine language for run-time up to 20 times faster. Supports all graphics modes, defined functions, and DOS commands. Einstein, 11340 W. Olympic Blvd., Los Angeles, CA 90064. $129. *5/83.*

EPF IV. Strand. Combines data-management system, Basic editor, and DOS 3.3 System Master. Features automatic insertion of frequently used subroutines, overlay control to maximize program space. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $79.95.

Flex Text. Simonsen. Adds graphics to text and vice versa; prints variable-width text with no hardware. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

✓ **Frame-Up.** Weishaar. High-speed display utility generates professional presentations of graphics, text frames. Text screen editor lets you create text slides, add type live during shows. Optional preprogrammed display for unattended shows. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

● **Global Program Line Editor.** Enhanced version of of *Program Line Editor* with programmable cursor and listing control. Edit line by line or by range of lines and search for strings. Synergistic, 830 N. Riverside Dr., #201, Renton. WA 98055. $60. *12/82.*

Merlin. Does assembly language programming with a dozen editing commands and 28 pseudo-ops. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $64.95. *1/83.*

ORCA/M. Westerfield. Object relocatable code assembler for micros. Macro language features; linker produces executable binary files. Coresident screen editor and system disk sector editor. Hayden, 50 Essex St., Rochelle Park, NJ 07662. Introductory, $99.95. *5/83.*

✓ **The Pascal Toolkit.** Bringhurst. Character generator and image creator with DOS-to-Pascal conversion of text and pictures. Includes Boolean function keypress. Wize Buys, Box 1588, Orem, UT 84057. $24.95.

ProntoDOS. Weishaar. High-speed disk utility cuts about two-thirds of the time off bload and save functions. Compatible with all DOS commands; frees up to 15 extra sectors per disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

Sphinx. Software giving single-pass encryption beyond 10 to the 400th power. Crane Hill, Box 273, Gonzalez, FL 32560. $37.50.

● **Super Disk Copy III.** Hartley. Easy-to-use menu-driven software utility; correct file sizes, undelete, free DOS tracks, more. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48003. $30. *10/81.*

Utility City. Kersey. Twenty-one utilities on one disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

Word Processing

Apple Writer II and **IIe.** Includes WPL (word processing language). Additional functions menu; continuing features and functions menu; continuous readout of characters and length. *IIe* has shift, shift-lock, and tab,

four-arrow cursor control, and delete key; data files compatible with *II*. Apple, 20525 Mariani Ave., Cupertino, CA 95014. *II*, $150; *IIe*, $195.

Apple Writer II Preboot. Armstrong, Borgorsen. Allows you to run *Apple Writer II* in 80-column format with the Videoterm 80-column card. Videx, 897 N.W. Grant Ave., Corvallis, OR 97330. $19.

Bank Street Writer. Kusmiak, Bank Street College of Education. Designed for use by whole family. Universal search and replace, word wrap are standard. U/lc without hardware. On-disk tutorial. Takes advantage of memory, keyboard on IIe, if you have one. Broderbund, 1938 4th St., San Rafael, CA 94901. $69.95. *2/83*.

Format-II, Enhanced Version. Hardwick, Beckmann. Word processor supports all popular 80-column cards, stores up to 50 pages of text on one disk. Includes single-keystroke editor, mailing list database; displays text on-screen exactly as it will print out. Compatible with hard disk drives. Kensington Microware, 919 3rd Ave., New York, NY 10022. $150.

Magic Window II. 40, 70 (in hi-res), or 80 columns in this expanded version. Compatible with Pascal 80-column. With user-tailored, fast menu; underlining; global search and replace. IIe version uses all 64K, more if you have it. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95.

PIE Writer. Business processor allows 9,999 pages. Word deletion, auto indent, spooling, and type-ahead buffer. Hayden, 50 Essex St., Rochelle Park, NJ 07662. $149.95.

ScreenWriter II. Kidwell, Schmoyer. No extra hardware for u/lc, 70-column display, printer spooling. Edits Basic, text, and binary files; complete search and replace. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $129.95. *1/83*.

● **Sensible Speller.** Spell-checking program sports listable 85,000 words, extensible up to 110,000 words. Recognizes contractions, gives word counts, word incidence, number of unique words. Clear documentation and simplicity of operation. Works with many word processors' files. Best of breed. Sensible, 6619 Perham Dr., W. Bloomfield, MI 48033. $125. *1/82*.

Super-Text Professional (40/80). Automatic 80-column, u/lc on equipped IIe; with appropriate equipment on II Plus. On-screen formatting and help reference guides. Muse, 347 N. Charles St., Baltimore, MD 21201. $99.

Word Handler II. Elekman. Simple program with straightforward documentation. Allows folded paper printout for two-sided printing. 80-column with the IIe. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $199. *11/82*.

WordStar. Screen-oriented, integrated word processing system in CP/M. Z-80. MicroPro, 33 San Pablo Ave., San Rafael, CA 94903. $495.

Apple III

Access III. Communications program for timesharing and standalone tasks; gives access to remote information services, minis, and mainframes. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Apple Business Basic. High-level structured programming language. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $125.

Apple III Business Graphics. BPS. General-purpose graphics program draws line graphs, bar graphs in three formats, overlays, and pie charts in 16 colors. Continuous or discrete data; curve-fitting capabilities. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Apple III Pascal. Program preparer with editor, compiler, disassembler, linker, filer, system library. Features cursor control, text modeling, formatting. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $250.

Apple Writer III. Lutus. Uses WPL (word processing language) to automate text manipulation and document creation. Adjusts print format during printing; translates from typewriter shorthand to English or other language and back again. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $225.

Catalyst. Allows boot from hard disk; transfers all programs to ProFile. Quark Engineering, 1433 Williams, #1102, Denver, CO 80218. $149.

Hardisk Accounting Series, 2.0. General ledger, accounts receivable, and accounts payable handle 32,776 customers or accounts; inventory features five methods of evaluation. Also payroll, management analysis, and mailing labels. Great Plains, 123 N. 15th St., Fargo, ND 58102. $395 to $595 per module.

Inkwell. Wunderlich. Word processor prints documents as they appear on-screen, simulates typewriter or creates form letters from mailing list. Horizontal scrolling allows text up to 155 characters wide. Foxware Products, 2506 W. Midwest Dr., Taylorsville, UT 84118. $185.

Mail List Manager. Generates, stores, sorts, edits, and prints mailing list files. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Micro/Terminal. Gives access to any in-house or remote database; set up and log only once. Built-in editor or edit off-line. Microcom, 1400-A Providence Hwy., Norwood, MA 02062. $99.95.

PFS:File. Page. Form-oriented information-management system stores and retrieves up to 32,000 entries. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

PFS:Graph. Chin, Hill. Works alone or interfaces with *PFS* databases and *VisiCalc* files. Produces bar, line, and pie charts, merging data from several sources. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

PFS:Report. Page. Generates reports; sorts, calculates, and manipulates data filed with *PFS:File*. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125.

Quick File III. Personal index card or filing system. Fifteen fields; file as long as disk allows; can be put on ProFile. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

State of the Art General Ledger and **Business Modules.** Standalone interfaceable modules for 12 accounting periods. *General Ledger* can handle 470 accounts, 100 transactions before updating files. Modules for budget and financial reporting, accounts receivable/payable, and inventory control. State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626. *General Ledger*, $595; modules, $495.

ThinkTank. Idea processor program allows you to see ideas in outline form. Outline can be collapsed to see the big picture or expanded to reveal hidden details. Living Video Text, 450 San Antonio Rd., #56, Palo Alto, CA 94306. $150.

VersaForm. Landau. State-of-the art business-forms processor. Does invoicing, purchasing orders, mailing lists, client billing. Powerful, complex, worth getting to know. Hard-disk-compatible. Applied Software Technology, 14128 Capri Dr., Los Gatos, CA 95030. $495. *8/82*.

VisiCalc Advanced Version. For corporatewide modeling applications; develop sophisticated templates to be filled in by novice users. On-screen help, IRR and calendar functions, macro facility, variable column widths, locked cell values, and hidden cell contents. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $400.

VisiCalc III. Software Arts, Bricklin, Frankston. Just like it sounds; expanded memory, u/lc, 80 columns. Four-way cursor movement. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.

VisiSchedule. Critical path PERT scheduler. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $300.

Word Juggler. Gill. Word processor uses expanded memory. Printout can be viewed on-screen prior to printing; multiple copies printed of selected pages. Quark Engineering, 1433 Williams #1102, Denver, CO 80218. $295. *12/82*.

Predictable.

A flawless future is in sight with 3M diskettes.

When it comes to keeping track of precious data, predictable means reliable. Being able to count on every diskette, every time. At 3M, reliability is built into every diskette. We've been in the computer media business for over 30 years. And we've never settled in. We're constantly improving and perfecting our product line, from computer tape and data cartridges to floppy disks.

3M diskettes are made at 3M. That way, we have complete control over the entire manufacturing process. And you can have complete confidence in the reliability of every 3M diskette you buy.

Look in the Yellow Pages under Computer Supplies and Parts for the 3M distributor nearest you. In Canada, write 3M Canada, Inc., London, Ontario. If it's worth remembering, it's worth 3M diskettes.

3M hears you...

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Open Discussion gives you the chance to air your views and concerns, to seek answers to questions, to offer solutions or helpful suggestions, and to develop a rapport with other readers. It's what you make it, so share your thoughts, typed or printed, and double-spaced (please), in Softalk's *Open Discussion, Box 60, North Hollywood, CA 91603. To ensure the inclusion of as many contributions as possible, letters may be condensed and edited.*

OPEN DISCUSSION

Game Time
It's about time! Finally, after what seems like a six-month rest, a group of good Apple games appears. Incidentally, why is it that all the new software seems to come out around the Christmas holidays, when you can least afford to buy anything new for yourself?

On to one minor gripe—why do software companies so often start to advertise a new piece of software so far in advance of when it is actually ready? They could save the poor stores and mail-order houses a lot of unnecessary questioning about release dates if they would wait until a month or even a few weeks before release. Or they could follow the style of Broderbund, which apparently finishes programs first and advertises later.

Now to sing my praises of three new games: *The Mating Zone*, from Datamost; *Hard Hat Mack*, from Electronic Arts; and *Zaxxon*, from Datasoft. All are excellent, with good graphics and good play. Best of all, my husband and I would like to extend our profound thanks to *Zaxxon* and to Datasoft for restoring our faith in our Apple. We were so disappointed with the graphics of *Frogger* that we were almost afraid to buy *Zaxxon*, fearing an equal desecration of a fine arcade game. The Apple version of *Zaxxon* is outstanding.
Marianne Highsmith Range, Chicago, IL

Nominations
To respond to Leroy Stone's challenge in the June issue to identify companies that give good support after the sale, I'd like to nominate two of my personal favorites: Videx Corporation and Gold Disk Software. Videx has always handled my technical requests promptly and professionally. Gold Disk has never let me down, as other catalog mail-order houses have. The people at Gold Disk give me honest and reliable service and go out of their way to get special information such as technical data on the Japanese import disk drive I purchased from them last spring.
Ken Fleer, Newark, DE

Get the Picture?
I read a lot of negative comments about the perils of purchasing mail-order computer equipment. I would like to share a positive experience I had recently. I bought an Amdek Video-300 monitor from a mail-order house in California. I live in Louisiana, so I was worried about what would happen if I didn't get what I wanted, or if I had any problems with defective merchandise. The advertisement touted a one-year warranty from Amdek.

I prepaid and soon received the merchandise. A short time after hooking the monitor up to my Apple II Plus, I noticed that the picture would not remain steady. Every now and then it would jerk slightly. This got to be distracting after a while, so I wrote to Amdek about the problem. The company sent back a return authorization for repair. When the set was returned to me, the problem still persisted. I wrote Amdek again. I soon received a reply from the folks at Amdek saying that they were sorry I was experiencing difficulty with the monitor and that they were shipping me a brand-new monitor in exchange for the defective one. Several days later UPS picked up my old monitor, and the next day the new one arrived. I really appreciate this kind of service. The next time I plan to buy a new peripheral, I know where I'm going to look first—the Amdek catalog.
Kermit A. Gaar, Jr., Shreveport, LA

Tightly Knit Support
I have been using *The General Manager* from Sierra On-Line for about one year. Originally, I was running the earlier version and was having very good success with it. The new version is even quicker and easier to use.

I am a manufacturers' representative for several yarn textile mills. I am not only able to keep up with the customers' shipments, but also with the commissions due and the yarns used during the year, by customer and by yarn size.

Recently I had the opportunity to test the sanity of the customer service reps at Sierra On-Line. I was unable to access my data and was in the position of having to go back to recover several days of entries that had not been backed up because of a glitch in the mechanical system of my Apple II Plus. On contacting Sierra On-Line, I discovered I had an unusual problem that had not happened before. The company very quickly directed me to Brillig Systems, the authors of the program. In a two-day period, Brillig not only diagnosed my problem but had saved my data and put it back in a usable condition. That is a good testimonial for a company that is concerned with the customer and the general business of its customers. Thanks to a supplier who cares.
Kenneth W. Winston, Jr., Charlotte, NC

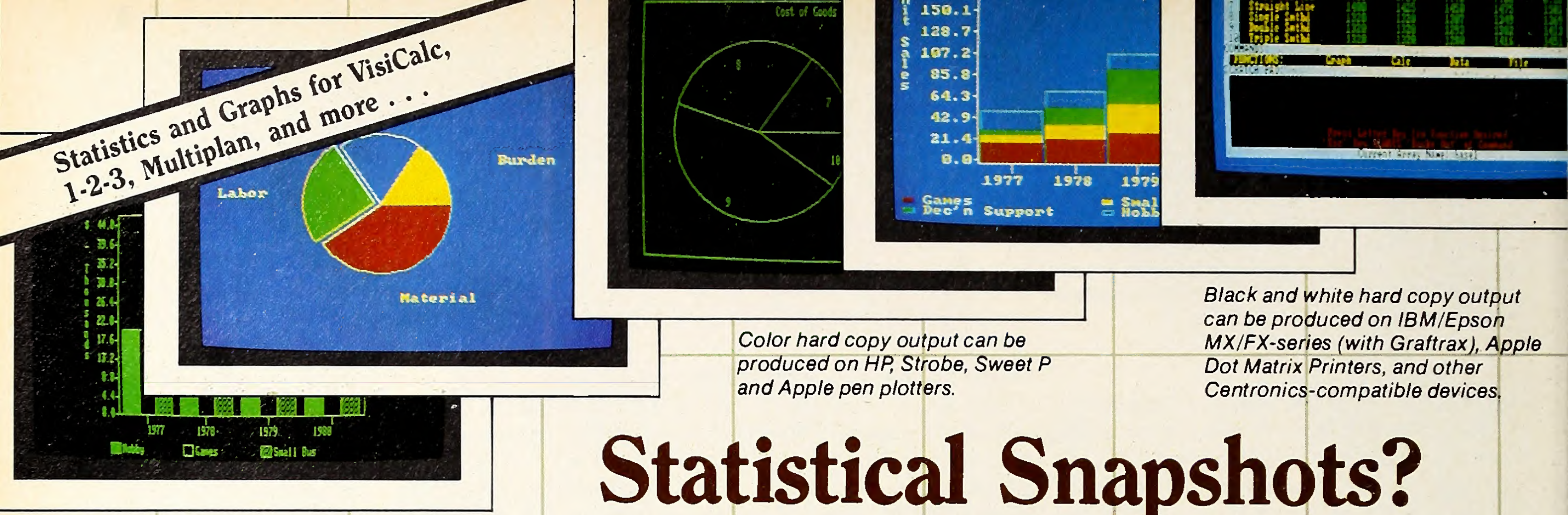
Sci-Fi It's Not
I purchased a Micro-Sci A2 disk drive through *Call—A.P.P.L.E.* twelve months ago to use with my II Plus. The drive plugged in and ran without problem using DOS, Apple Pascal, and the MicroSoft CP/M card. It ran without problem until last week, that is. Twelve days ago it made a grinding noise and stopped. I opened the drive, looked in (a small screw was loose), closed the drive, and shipped it back to Micro-Sci.

Today a drive arrived—new, not my repaired drive! Total cost: no charge! Will I recommend Micro-Sci? Yep; fantastic company, terrific response, and an excellent product. (No charge, can you believe it?)
Mark M. Huth, New Orleans, LA

White Like Us
They call it the US Festival, Wozniak and his associates. To them the term "us" apparently means "white people," since not one of the twenty-five acts that performed at Devore, California, in May could, by any stretch of the imagination, be called black. (Not even the English Beat, sorry.)

Yes, I know the organizers say they approached and were turned down by Prince and Michael Jackson. But even if that is true, does that excuse really close the case on the matter? Do they really mean to imply that Prince and Michael Jackson are the *only* black artists in this country popular enough or worthy enough to play at their multimillion-dollar-losing concert venture?

In defense against insinuations of racial pre-



Color hard copy output can be produced on HP, Strobe, Sweet P and Apple pen plotters.

Black and white hard copy output can be produced on IBM/Epson MX/FX-series (with Graftrax), Apple Dot Matrix Printers, and other Centronics-compatible devices.

Graphics output includes line charts, side-by-side and stacked bar charts, and pie charts. IBM PC version includes a high/low/close/volume securities chart. The Apple version includes a combined bar/line chart function and has a semi-log scaling option.

Statistical Snapshots?

Accelerate your trend forecasting in electronic spreadsheets with a revolutionarily simple visual statistics system: Graph 'n' Calc

The Missing Link. Until now, VisiCalc, Desktop Plan, Multiplan, and other DIF-accessed electronic spreadsheets have lacked two crucial functions: forecasting statistics and user-fluid 'analytical' graphics.

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Now, with Graph 'n' Calc, you can transform wild-guess *"what if"* scenarios into statistically derived *"what's probable"* models. That's a breakthrough, whether you presently have a spreadsheet program or not.

Never has statistical power been so fluid, easy to apply and intelligently focused.

"A TRULY ELEGANT SYSTEM". Independent reviewers rave about Graph 'n' Calc, its balance of power and ease of use.

By taking complex formulae and reducing them to a single keystroke, now even 'hunt and peck' business executives can perform: multiple linear regressions, exponential smoothing, time series and seasonality factoring, advanced mathematical functions, and even user-supplied BASIC subroutines, all conveniently tucked away in an easy access menu.

Specifically designed to share data files with DIF-accessed spreadsheets such as VisiCalc and 1-2-3, Graph 'n' Calc lets you extract rows and columns of numbers, statistically manipulate them, improve their accuracy, and pass them back to your other spreadsheets.

Goal-Seeking Graphics. Unlike any other spreadsheet or graphics packages today—integrated or stand alone—Graph 'n' Calc *lets you think in a visual domain!* How?

By streamlining the drawing routines, adding 'best guess' statistical defaults and a quick escape command structure. This means that graphs are easy to draw, redraw and draw again . . . in seconds.

Human beings naturally process pictures thousands of times faster than words and numbers.

With Graph 'n' Calc, you now have the ability to visually process normally tough numerical values such as trends, seasonal fluctuations, and rates of growth. Independent research suggests this visual approach can increase decision analysis productivity 20 fold!

"EERILY ACCURATE". That's what experienced VisiCalc and 1-2-3 users have said about Graph 'n' Calc.

"Graph 'n' Calc doesn't replace your electronic spreadsheets, it just makes them more accurate and saves hours and hours of work building probability forecasts," says another software magazine.

Come see for yourself, the "Polaroid" equivalent of the statistical graphics systems at your nearest computer store.

Color and monochromatic video display versions are available for the IBM PC and Apple systems, respectively.

DESKTOP COMPUTER SOFTWARE INC.

Graph 'n' Calc

303 Potrero St. 29/305
Santa Cruz, CA 95060
Telephone (408) 458-9095

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judice, US organizers have explained that soul and funk acts would not fit in with their program of new wave, heavy metal, and pop music. Hasn't rock 'n' roll's heaviest influence by far always been American rhythm and blues? Wouldn't David Lee Roth and Tom Petty, and all the others, readily attest to that? And what of the more recent influence of reggae on rock? Can anyone in his right mind describe much of the music that The Clash and David Bowie are playing these days as anything but funk? Give *us* a break, Woz!

Next year, if there is another US Festival, I'd like to hear the music of some of the many excellent black artists, and not just lame excuses.

Elizabeth Goldsmith, Los Angeles, CA

A Matter of Interpretation

Softalk's interpretation of software sales statistics (May and June Bestsellers) seems to have overlooked the obvious. Computers are rarely purchased for the exclusive use of one individual. Current popularity of the term "personal" computer is somewhat misleading: A computer, unlike a toothbrush, is better when shared.

The simultaneous popularity of word processors and typing instruction programs is easily explained. Perhaps mom and dad know how to type, but the kids are just learning. Even an experienced typist might want to become accustomed to the feel of the keyboard without the added complication of learning how to use a word processor at the same time.

This brings me to the comments that appeared on lagging game sales. We surely don't need more fuel for the copy-protection bonfire. The suggestion that software piracy accounts for a drop in sales of game programs is not helpful. It borders on irresponsibility—unless you have evidence that's a lot stronger than sales statistics. Many small computers are purchased by businesses. Whereas *Typing Tutor* might be purchased, *Choplifter* would not be. I write a lot of short programs myself. In case anyone hasn't noticed, microcomputers are fantastic programmable calculators. Game vendors would like to believe there is an unquenchable desire for their programs that must be satisfied by any means, fair or foul. It would be more constructive to realize that some computer owners just don't want games.

J.M. Rowe, Torrance, CA

One of *Softalk*'s most interesting features is the comments portion of Bestsellers. However, you've really been off base with the remarks about the apparent contradiction between high sales figures for both word processors and typing tutors.

Contrary to what you have suggested, the individual most in need of a word processing program is the one who types poorly or not at all. Without the editing and variable-formatting abilities of a good program, trying to produce finished letters, documents, and reports is an extremely frustrating chore for someone like myself who, at best, uses four or five fingers on the keyboard. At the same time, many of us "fumble fingers" recognize the desirability of increasing our touch-typing skills, hence the high sales of the typing tutor programs.

My conclusion is that the similar high sales figures for both word processing programs and typing instruction programs is normal and should be expected.

L.H. Axtell, vice president of sales, The Floppy House, San Diego, CA

Thoroughly Dressed Down

While ours is an equestrian publication, we are very much into the use of microcomputers. One of our editors is an Apple man, and he reads *Softalk*. Recently he brought to my attention your June issue because of the article on how the Chauncey farm uses micros. I was a little surprised to read on the contents page that "the Chauncey farm in Arizona breeds Thoroughbred Arabian horses. . . ." Sorry, but whoever wrote this made a big mistake. There ain't such an animal as "thoroughbred" Arabian. Only a purebred exists. Thoroughbreds are a breed of horse, originating in England, and they are the ones that run at most of the racetracks in the world, such as the Kentucky Derby. The Arabians that have pure Arabian blood are purebred Arabians.

Ivan I. Bezugloff, Jr., editor/publisher, *Dressage & CT* magazine, Cleveland, OH

Back and Forth and Back Again

We at Transtar were very pleased to see the review of our Transtar 130 in the May issue of *Softalk*. We pride ourselves on producing dependable, quality peripherals. The review certainly got that point across. I would like to clear up a couple of points made in the review that may not have been clear at the time you were examining the 130.

First, the Transtar 130 *is* capable of bidirectional printing (notice that it prints bidirectionally on the self test) if the software being used supports that feature. Second, there is a bidirectional tractor available as an option for the Transtar 130 ($149 retail) that enhances forms handling and makes the printer that much more flexible. Finally, the retail price of $895 quoted in the review is correct for the parallel version of the 130. However, we now have a serial (standard RS-232) version on the market that retails for $950. It has, in addition to the features found on the parallel unit, a built-in 2K buffer.

John P. Schuitemaker, Transtar, Bellevue, WA

The phrase "if the software being used supports that feature" is telling. Many printers print bidirectionally whether or not *the software tells them to. The Transtar, being Diablo-compatible, does bidirectional printing, but not automatically. Half the point is conceded.*

Thanks for the short review of the Transtar 130 printer in the May Marketalk Reviews. I have had this printer for two months and use it with the IIe and *WordStar*. It is a solid, excellent printer—a real value for the dollar.

What graphics can the machine do? I would love to have graphics capability with it. Yet, the

preliminary version of the printer manual (1/83) that came with the machine makes no mention of graphics.
Jerry Nachison, Washington, DC

You can print graphics on the Transtar 130 printer using Zoom Grafix *or* Printographer *configured for a Diablo printer.*

Homely Substitution
I have been using GraForth since last September and have found the "Animated Apple" articles very helpful. The GraForth manual is excellent, but the *Softalk* articles have thrown much-needed light on the subject.

I was totally bewildered by the 3-D image data sets until the January article. I am writing because of a bug I have found that concerns the image data sets—at least I think it is a bug. I am writing a program that moves two balls through a maze using moves entered from the keyboard. A text window asks for distances in the X and Y directions, and the ball moves along the resultant path, one pixel per loop.

The draw command, according to the manual and the article, begins by erasing the image on the invisible graphic screen, using data from the undraw image data set, and then draws a new image, using data from the draw image data set. Then the screen is flipped to display the new image. In my program, on the first draw command in the loop, the old image was not being undrawn. This left a residual image on one screen at the starting point that winked on and off, blowing a visual "raspberry" at a poor, bewildered, frustrated, would-be programmer.

I was able to solve the problem by issuing an "X object off draw" command. This had to be done twice to correct the situation. It solved the problem but did not explain why the problem existed. After reading the January article, I began to examine the data sets with peeks and eventually discovered that the home command was causing the trouble. The home command puts a zero in the flag byte of the interim and undraw data sets.

When a draw command is given, the old image on the screen that is not displayed is erased before the new image is drawn if, and only if, there is a positive number in the flag byte of the undraw data set. There also has to be a positive number in the flag byte of the interim data set.

The best way to deal with this problem is to avoid using home when using 3-D graphics. If the text window is small, a few carriage returns can scroll it clear. If home must be used, then the object to be drawn following it must be referenced twice with a draw command to restore the flag bytes to normal. I hope this will help someone to avoid the frustration I had with this problem.
William D. Carswell, Ramona, CA

The manufacturer responds:

Mr. Carswell is absolutely right. The home command does zero the flag bytes in the two data sets, preventing the previous 3-D object from being undrawn. However, this was put into GraForth on purpose to prevent the opposite problem when no text window is set.

Consider a 3-D-graphics program where there is no text window. Executing home would erase the entire screen, including any 3-D objects. If home didn't zero the flag bytes, then the next draw command would try to erase where the 3-D objects *used* to be, possibly destroying new graphics and blowing yet another "raspberry."

Zeroing the flag bytes is good, unless a text window is set and the 3-D objects are outside of it. In this case, there's a sneaky solution: You can clear the text window by substituting a call 27972 for home. The call hops into the middle of the clear-and-home code in GraForth, bypassing the routine that zeros the flag bytes.

Thanks for pointing out the problem.
Phil Thompson, Insoft, Portland, OR

Until the SOS Is Served
I have been an Apple owner since 1977 (my Apple II had serial number 6795), and I recently traded my Apple II for an Apple III. The Apple III is an extremely versatile machine, in that everything is software-based and, as a result, modifiable. Unfortunately Apple has been slow in releasing information on its SOS operating system, which has resulted in very little software being published for the Apple III. Hopefully, this will be rectified in the near future with the publication of the long-awaited *SOS Operating Manual*. In the meantime I have some information that other Apple III owners might find of interest.

I highly recommend a new publication devoted exclusively to the III called *On Three* (Box 3825, Ventura, CA 93006). The magazine has technical tips and tutorials on Business Basic and Pascal.

A lot of Apple III owners have had trouble with color monitors in the emulation mode (color is not supported and everything comes out in black and white). The solution is to have the cables to the color video port set up to accept composite NTSC color video (via pin 12) rather than the RGB signal. The NTSC video is compatible with all standard color monitors (non-RGB) and also works well with a video recorder, allowing direct video recording in color of anything that comes over the Apple III screen in both emulation and Apple III native modes.

With the above video connection, most Apple II games can be viewed in color in the emulation mode. There is still the problem of the III accepting game-paddle inputs, as the Apple III paddles are physically wired differently than the Apple II. This can be corrected by a software correction available from TG Products in Texas, the same folks that make those great game joysticks. This program, called *Modifier for the Apple III*, actually makes a change to the emulation disk so that the emulation mode will read the joysticks in the same manner as the Apple II. Any games that use the standard Apple II game-paddle reads will run correctly in emulation mode. Beware, however, of software companies that use nonstandard joystick reads.

I have found that the Megabyter disk controller card from Sorrento Valley Associates works very well with Shugart 800/850 eight-inch disk drives. This arrangement provides 2.4 megabytes of on-line line storage that can be used in either Apple II emulation mode or Apple III native mode. Another big plus is that the eight-inch drives are formatted in standard IBM format, which allows data to be transferred between the Apple III and an IBM mainframe (in my case, the IBM System 34). I prefer this arrangement to the Apple ProFile because it's cheaper, easier to back up, and provides data transportability.

Now someone out there may be able to help me. I use the Apple Graphics Tablet extensively in my work and it works very well in emulation mode. Does anyone know how to take advantage of the Apple III's enhanced graphics in native mode with the Tablet? This should be accomplished via a driver and some modifications to the Tablet software.

One last quick comment concerning Taylor Pohlman's Third Basic column in *Softalk*. I have enjoyed the series so far and I am learning a great deal by following the examples presented. However, the February article on the Drawimage editor left me in the dark. I spent a couple of hours typing the code—only to find it had several errors and no documentation as to how to run the program. The series has continued using the Drawimage editor as a basis for additional programs, but I am still stuck with

an editor that I don't fully know how to operate. Line 2605, for example, has a goto to statement 2700; however, there is no line 2700. Please publish a corrected listing and instructions as to its use.
Eric Moeller, Libby, MT

Taylor Pohlman responds:

Thanks for the comments, and for pointing out the error in the Drawimage editor that appeared in the February installment of The Third Basic. To correct the problem, change the following lines in the program:

```
2605  GOSUB 3000: IF fin THEN 2640
2640  RETURN
```

Taylor Pohlman, Mountain View, CA

The Printing of SoftGraph

The only thing that bothered me about David Durkee's *SoftGraph* disk was the lack of a printer routine. In the parting paragraphs in his article, Durkee said he was not including a printer routine because of the numerous differences between printers. I have written to say that there is a definite need to tell novices such as myself how to do it.

My Apple has a Silentype printer hooked to it, and the book for the printer generally says what author Durkee said—no problem. Well, I tried my darnedest to get the pie chart to print out, but never could. The problem is that the program was designed to display the graph; then, when you touch any key, it goes to a menu that allows you to see the chart again, or go to the main menu, or reset parameters. Well, I didn't want any of that. I wanted to interrupt the program with a control-C (like the Silentype manual said to do), initialize the printer, and give a control-Q to produce a printed copy.

Please print some wise words for the ignorant but enthusiastic folks like me, showing us how to embed a printer routine in programs so we can have control of our machinery. Thanks.
Michael P. Jaquish, Tullahoma, TN

David Durkee responds:

Despite what the Silentype manual may say, you don't need to use control-C to get out of the program to print graphics. As Michael Jaquish points out, this method won't keep the picture displayed on the screen in *SoftGraph* anyway. The easier way of doing things is to quit the program from the main menu. The last chart you created will still be in memory, even though it isn't being displayed.

At this point you could enter the PR#1 from the keyboard to activate the Silentype. You would still have to type in pokes to set the screen to page two, the hi-res page used by *SoftGraph* (*poke −12525,64*); print unidirectionally (*poke −12529,128*), which results in a much better picture quality on the Silentype; and print in inverse (*poke −12524,0*), which turns the white lines of the screen to black lines on paper. Then you can type control-Q. It's not very efficient to type in these pokes every time you want to print a picture, but they don't seem to work correctly from within a program. (Anybody know why?)

Another solution is to put all the necessary commands into a text file so they can be executed by the computer as if they were typed at the keyboard. Here's a short program to create that text file:

```
10  D$=CHR$(4)
20  PRINT D$;"OPEN DUMP"
30  PRINT D$;"WRITE DUMP"
40  PRINT "PR#1"
50  PRINT "POKE -12525,64"
60  PRINT "POKE -12529,128"
70  PRINT "POKE -12524,0"
80  PRINT "MONICO"
90  PRINT CHR$(17)
100  PRINT "NOMONICO"
110  PRINT "PR#0"
120  PRINT D$; "CLOSE DUMP"
```

Running this program creates the text file Dump. With this file on your *SoftGraph* disk, you can quit the program at any time, then type *exec Dump* to send the last picture displayed to the printer. Remember, this solution works only with the Silentype.

The solution, if you own another graphics printer, is to buy either hardware or software that will do the job. The hardware option is an interface card that has the necessary firmware for printing graphics, such as the Pkaso from Interactive Structures or the Grappler from Orange Micro. If you have one of these cards, its manual should explain how to print graphics. Just follow the instructions for printing out hi-res page two.

Those who don't already have such a card will find the software option a less expensive solution to the problem. There are a few good programs on the market for printing graphics. Most of them work on many different printers; also, there are different versions available for a selection of printers. Three such programs are *Image Printer* from Sensible Software, *Zoom Grafix* from Phoenix Software, and *Printographer* from Southwestern Data Systems. This is a less expensive alternative to purchasing a special interface card, and these programs are generally easier to use.

Another piece of software that will do the trick is *Fontrix* from Data Transforms. Though a little more expensive than the other programs mentioned, it has the capability of adding different types of text to a picture (in upper and lower case—much better than *SoftGraph*'s alphanumeric shape table). It also allows you to print a picture as part of a larger hi-res construction, including text and graphics from other sources. Check out the more detailed description in *Softalk*'s July '83 Marketalk Reviews.
David Durkee, Burbank, CA

On the demonstration disk included with the new Apple dot-matrix printer is a program, *DMP Exerciser*, which is similar to *Graphtrix*, a program many of us have used with our II Pluses and Epson printers. However, *DMP Exerciser* will dump only one hi-res picture to the Apple printer: the hi-res picture included on the disk. By deleting one line and adding three lines you can make *DMP Exerciser* a versatile hi-res dump program. Load *DMP Exerciser PT2*, delete line 45630, and type in the following three lines:

```
45625  INPUT "NAME OF FILE?
       (C)ATALOG ";FI$
45630  IF FI$="C" THEN PRINT
       CHR$(13)+CHR$(4);"CATALOG,D2"
       :GOTO 45625
45635  PRINT D$;"BLOAD";FI$;
       ",A$2000,D2"
```

Now save the program. Deleted line 45630 in the original loads the Apple printer log. (Don't delete the file because one of the other programs uses it to display the logo on-screen.) Line 45625 gets the name of the picture (file) you want to dump to the printer, and line 45635 loads it onto hi-res page one. Line 45630 allows you to catalog the disk first to check the name of the file. If you have only one drive, delete the *,D2* from lines 45630 and 45635. Now, when you run the *DMP Exerciser* program, you will choose number 5—Print Text or Graphics on menu 1, choose number 6—Print Hi-Res Graphics Image on menu 2, and choose the appropriate size and mode (inverse/normal) on menu 3. Then, when prompted, enter the picture file name (switch disks now on a one-drive system) and watch the picture being "drawn" on the printer. *DMP Exerciser* allows you to do a number of things with the Apple dot-matrix printer. With these changes, it will also allow you to dump hi-res images of your choice to the printer.
George Tylutki, La Plume, PA

Straightforward Clues

An item recently appeared in Open Discussion suggesting a rather tortuous way to insert the escape character in *Apple Writer II* text files. Most printers recognize this character (hex 1B) and examine the successive characters to select a new mode of operation.

Unfortunately, nowhere does the manual describe how to enter the escape character. In the April Open Discussion, another reader suggested editing a provided glossary file that already contains escape characters (displayed on the screen as a flashing [ ). It turns out that there is a much more straightforward method.

The clue is on page 52 of the manual, in the discussion of footnote entry procedures. It implies that the escape character can be entered somehow by using the control-V function, which allows entry of control characters. When control-V is pressed, any control characters typed will be entered into the text instead of executing their assigned functions. This mode is deactivated by pressing control-V again.

One might think that pressing control-V followed by escape would therefore do the trick. It's not quite that simple because, even in control-V mode, pressing the escape key changes the cursor to a flashing ∧ to allow upper-case entry. Happily, it turns out that pressing escape a second time does, in fact, produce the flashing [that signifies the escape character. The sequence control-V escape escape control-V is the answer. (The second control-V terminates the control character entry mode.)

Now I'll follow this answer with another question: Does anyone know how to enter a control-V into the text? I don't really have a use for it; it seems so untidy to be able to enter all other control characters and not this one.
Gordon B. Alley, San Antonio, TX

I'm writing this letter using *Apple Writer II* on my Apple IIe (without an eighty-column board). However, I am using the shift key for upper and lower case instead of the escape key. I have done this by replying yes when asked if I have upper and lower case, turning on all caps via control-K, and releasing the caps-lock key. From that point on, I can use the shift key for upper case and get lower case otherwise. Was this planned or is it just a lucky break?

I still have one problem. How do I get underlined words on my Epson MX-80 printer using *Apple Writer II?*
T.A. Reif, Houston, TX

Prowriter Pros and Cons

I pass along the following for the benefit of others who may have purchased a C. Itoh Prowriter 8510A dot-matrix printer for use with an Apple II Plus. This printer is compatible with the Apple dot-matrix printer, and I had supposed that its marriage with the Apple would go smoothly. Unfortunately for me, the dealer was discontinuing the line and showed no interest in helping me once the printer had crossed his counter. The Itoh manual is poorly organized and difficult to follow without considerable study and assistance. By dint of much effort, I finally was able to get the necessary information, which I gladly pass along.

For an RS-232C serial interface, the dip-switch settings on the Itoh are as follows:

Switch one: 2,6,7,8—closed
Switch two: 6,7—closed
Switch twenty-one: 4—closed
Switch twenty-two: 2,3 —closed
Switch twenty-three: 1,5—closed
Switch twenty-four: 1,3,5,8—closed
All other switches should be open

You would never guess these settings from reading the Itoh manual. I obtained them from the technical services hot line, operated by Leading Edge, C. Itoh's distributor in the United States (800-343-6833).

I had an additional problem getting the printer's escape commands to operate from inside my word processing program, *Apple Writer II*. Doing this involves the command control-V, but the exact sequence is a bit tricky. Underlining, for instance, is done (according to the manual) by using escape-X. The actual sequence of commands is control-V escape escape control-V capital X. (The shift-capital modification does not affect this sequence.)

The second escape will bring up on-screen a flashing left square bracket, which indicates that the following character is controlled by the escape command, a fact not mentioned in the Itoh manual.

To go back to nonunderlining, use escape-Y in the same way. It is possible to replace these commands with single-stroke glossary commands in *Apple Writer II. Apple Writer*'s own underline command (backslash) will not work. You will simply get alternate letters and underlined spaces.

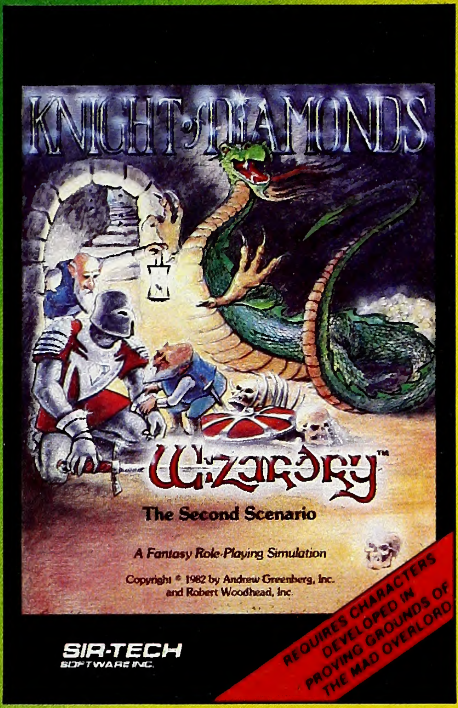
The same escape sequence is used to call up the different character pitches, line spacing, and so forth; it is, not surprisingly, the same procedure used in the Apple dot-matrix printer.

I would like to take this opportunity to thank the people at The Computer Tree in Endwell, New York, for giving generously of their time to help me with this problem, and especially for showing me the above escape sequence, even though they did not sell the Itoh to me and do not even carry it.
Stuart O. Landry, Jr., Endwell, NY

Two-Step Polka Dot Dot Dot

I am writing concerning the two letters from Charles Miller (April and June Open Discussion) in which he describes his methods of accessing the printer escape commands for the Epson MX-80 from *Apple Writer II*. I tried all the various procedures but nothing happened, just the plain old dot dot dot matrix. In my last desperate attempt, I rebooted the *Apple Writer II* without the Videx eighty-column preboot and used forty columns. Bingo! There was my letter in emphasized type. Double strike worked like a charm too. Thanks, Chuck!
Charles Patalive, Washington, DC

Wizardry



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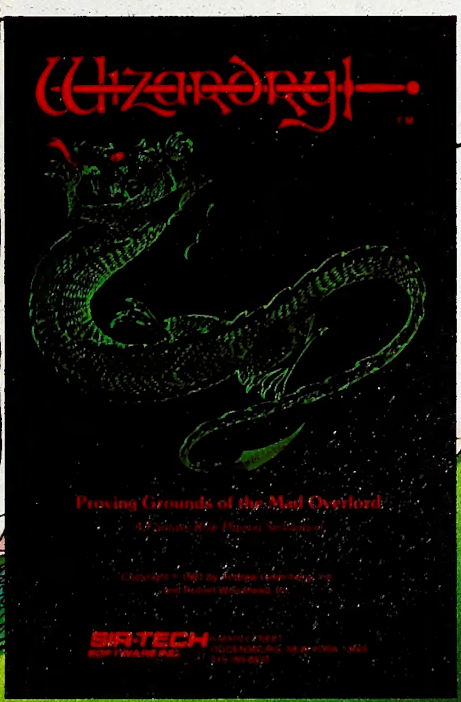

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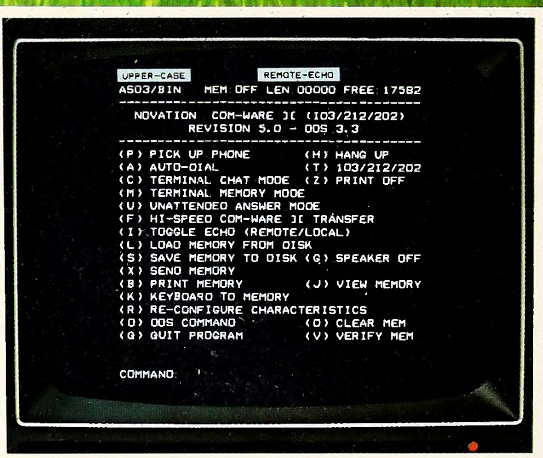

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If you have an Apple-Cat II and our earlier Com-Ware (4.4 or earlier), you should really have the new one (5.0). As always, it's free.

Crossing the Micro Line
I am attempting to interface *Apple Writer II* with an Okidata Microline 92 printer and am experiencing considerable trouble. I have also tried to interface Muse's *Super-Text 40/80* with similar problems.

The main difficulty seems to be that I can't find a way of embedding ASCII character strings or control commands in the text. The printer won't respond. I am using an Apple II Plus with a Videx 16K expansion board. I find that I must initialize with control-V control-I 80N control-V to get a printout past forty columns.

If the initialization command suffix is a capital N, I get 17 cpi print, whereas if it's a lower-case n, I get the 10 cpi text. If I attempt to bury the control-I 80N in the text, I then can't return to 10 cpi with a control-V control-I 80n control-V. Neither of these commands seem to relate to the Okidata Microline 92 instruction book.

In the *Apple Writer II* program the command for continuous underscore is the backslash, one to start and another to stop. If I attempt to use this command _t_h_i_s _i_s _w_h_a_t _I _g_e_t. I also do not seem to be able to make the super or subscript functions work.

My frustration is compounded by the fact that a couple of my clients have Microline printers and it would be nice to be able to use theirs while visiting them, making my Apple somewhat portable. Any assistance with these problems would be greatly appreciated.
Evans Harrell, Marietta, GA

Show Me the Entry Way
I understand how to embed control characters within an *Apple Writer* text file. My problem is not knowing what keyboard entries will create the printer commands needed for my Okidata. For example, to print wider characters, I need to specify CHR$(31). How can I do this? What keyboard entry will create the value of CHR$(31)? Is this even possible?
Connie Kouba, Eden Prairie, MN

Print Data Okay
I have replaced my Okidata printer ribbon with both an Underwood standard typewriter ribbon and a KO Rec type #1 typewriter ribbon. The latter was bought at Woolworth's for two dollars. I'd be interested in hearing about the experiences (or any programming tips) of other users who've used the Apple II Plus with the Okidata printer #82A.
Joseph Buonincontri, Maplewood, NJ

Panasonic Printer Panic
This is an open plea for help. I own an Apple II Plus without an eighty-column card and a Panasonic KX-P1090 printer without an intelligible manual. The first word processor I managed to get my hands on was *Apple Writer II*, and I use it constantly. However, I have been unable to use the *Apple Writer II* subscript and superscript routines with my printer. Does anyone else know how to do this? By the way, my thanks go to Charles Miller and Tim Anderson for their suggestions in the June Open Discussion, as I have been able to make some simple text alterations using their methods.

I must add that the contrast between the *Apple Writer II* manual's clear and concise writing and the hopeless mess offered by Panasonic tends to make one sit and curse the printer for hours.

Another question: Does anyone out there know how to dump graphics with the Panasonic printer?
Pete Higgins, Fairfield, CT

Commanding Solutions
This letter is in response to Mark Wolfson's letter in the June Open Discussion. He was having trouble converting his binary *Apple PIE* files to text files compatible with *Apple Writer II* (or *IIe*). The solution is simple.

Using *Apple PIE* from the COMMAND? level, load your binary file into memory just as if you were going to reedit the file. Then, simply use *Apple PIE*'s capability to write a standard Apple text file. The command is a right arrow issued again from the COMMAND? prompt, followed immediately by a new file name. For example, if you loaded a binary *PIE* file named File, you would save it as a text file (use a different name) by simply typing > *FILE.TEXT*. If, from the COMMAND? prompt, you issue a MON I,C,O, you can use the right arrow and you'll see your file appear on-screen as it is being written to disk. You can then use the text version in *Apple Writer II* (and, I think, *IIe*) by just changing the commands embedded in the file (the two programs' commands are not compatible).
Owen H. Richelieu III, San Marino, CA

Add *PIE Writer* to the list of word processing programs that don't need separate terminal programs for transmitting their files ("Apple on the Phone," June 1983 *Softalk*). *PIE Writer* can be used to control a modem of any type. Instructions and examples are included in its manual for the transmitting and receiving of files. It is not necessary to have *PIE Writer* at the other end of the telecommunications line.

Coordinators of PeaceNet, San Francisco's disarmament electronic bulletin board, say they use *PIE Writer*'s telecommunications capabilities almost as much as they use its word processing functions. They ship already written messages directly out of *PIE Writer* onto their various bulletin boards around the Bay Area.

On another subject, in answer to Adam Taub's plea for Centronics 739 articles and programs, the 739 is one of the many printers for which *PIE Writer* will automatically configure itself.
Ron Lichty, programmer, Softwest,
Sunnyvale, CA

Clearing-house of PIE
If you are an *Apple PIE* or *PIE Writer* word processor user with an Apple II or IIe, then you will be interested in a new user group now forming called Apple PIE Writers. As the name indicates, we plan to support all Apple versions of *PIE*. This support will include tips, tricks, modifications, help, and just about anything to enhance your use of the already outstanding *PIE* word processor.

If you have madc some modifications to *PIE*, let us know; maybe others would be interested. If you have questions, ask the group; somebody will have the answer. This is *your* user group; we are just the clearing-house.

Depending on the response we receive, a newsletter will be published whenever we have sufficient material to warrant one. Right now membership is free, so if you are a *PIE* user, send us your name, Source or CompuServe ID (if applicable), and your mailing address. Tell us which version of *PIE* you use—*Apple PIE* or *PIE Writer*, forty or eighty column (specify your board)—and whether you are using an Apple II or IIe.

Send the information to Apple PIE Writers, Box 589, Hawthorne, CA 90250; (Source: CL1312, CompuServe: 74405,764).
Monty Lee and Mike Weasner,
Hawthorne, CA

See How Pascal Runs on a IIe
As a Pascal user who entered the Apple fold via a IIe, I was surprised to find that I am doing the impossible according to Douglas Peterson (June Open Discussion). First, there is no problem using Pascal 1.1 with the Apple IIe with a two-drive system; just use the procedures out-

lined for a two-disk startup discussed in the Apple-supplied manuals. However, one-drive operation is not possible using the published procedure, for the reason mentioned by Peterson: the new IIe reset feature.

However, the following procedure will allow a user to use Pascal 1.1 on the Apple IIe with a single disk drive:

1. Boot up with APPLE3:
2. X APPLE3:FORMATTER in order to create a blank disk.
3. Boot up with APPLE1:
4. Create a new APPLE0: disk onto your blank disk using the filer transfer command.
5. Again using the filer transfer command, transfer APPLE3:SYSTEM.APPLE to APPLE0:SYSTEM.APPLE. You now have two APPLE0: disks, one with SYSTEM.APPLE and one without.

The bootup procedure is first to boot up with your APPLE0: disk containing SYSTEM.APPLE and then remove it. Replace it with the original APPLE0: (without SYSTEM.APPLE), then use the initialize command. This performs the necessary warm boot otherwise prevented by the new reset feature. You can now run the Apple Pascal 1.1 system using one disk drive. For those who are interested, this procedure came to me from Apple Canada after a number of angry phone calls and at least some sweating by an Apple senior programmer. Before I called, they claimed never to have been aware of the problem.

Donald Schopflocher, Sherwood Park, Alberta, Canada

Montezuma Would Be Proud

David Rabson inquired in Open Discussion about C compilers for the Apple II Plus working under Apple DOS. There is, in fact, a fine, newly updated Apple II C compiler available from Manx Software Systems of Shrewsberry, New Jersey. It's just one of the many C compilers that the company offers as part of its highly regarded Aztec C series. The Aztec compilers are full C compilers, with double-precision, floating point, a transcendental function library, and other powerful system features. They are, in my opinion, a bargain. The people at Manx are also uncommonly helpful, as a telephone call to them will quickly show.

Allen Wasserman, Corvallis, OR

No Trouble at All

In answer to Larry Freeland's question in the June Open Discussion of *dBase II* on the Apple III, I have successfully installed *dBase II* using the SoftCard III with very little trouble. The steps are as follows:

1. Boot from the CP/M System Master in drive A:.
2. Create a CP/M system disk on drive B: with the command COPY B:/F/S (this formats and copies the system boot tracks).
3. PIP on to the new disk the files Driver.SOS and PIP.COM:

```
PIP B:=A:DRIVER.SOS [OV]
PIP B:=PIP.COM [OV]
```

4. Take the new disk and put it in drive A:, then press control-C to warm-boot.
5. Put the *dBase* disk supplied by Ashton-Tate in the B: drive.
6. Transfer the files with the command *PIP A:=B:*.* [OV]* (this transfers all the files to Apple III CP/M files).
7. Repeat the same steps for the ZIP disk. You may have to delete the Driver.SOS file temporarily to make enough room.
8. Boot the *dBase* disk that was just created and run *Install*. A listing of the entries I used to adjust the installation procedure is available by contacting me through Open Discussion.

Arnold Bailey, Carmel, NY

Taking the CUE

As a teacher, I am very sensitive to Judith Juskowich's plea (June Open Discussion) for a resource for public domain educational software. Computer Using Educators (CUE), a group centered in (but not confined to) the San Jose, California, area, runs an educational "softswap" that compiles and disseminates educational software. I have used many softswap programs with my class of learning-disabled students, but most programs are appropriate for gifted students. Softswap programs are available through mail order for a nominal fee.

For a catalog and an order form, send $1 to Ann Lathrop, Softswap Chairperson, Microcomputer Center, SMERC Library, San Mateo County Office of Education, 333 Main Street, Redwood City, CA 94063. Incidentally, CUE membership is very inexpensive, and the group publishes a bimonthly newsletter for educators.

Steven Spencer, Morgan Hill, CA

Textbook Basics

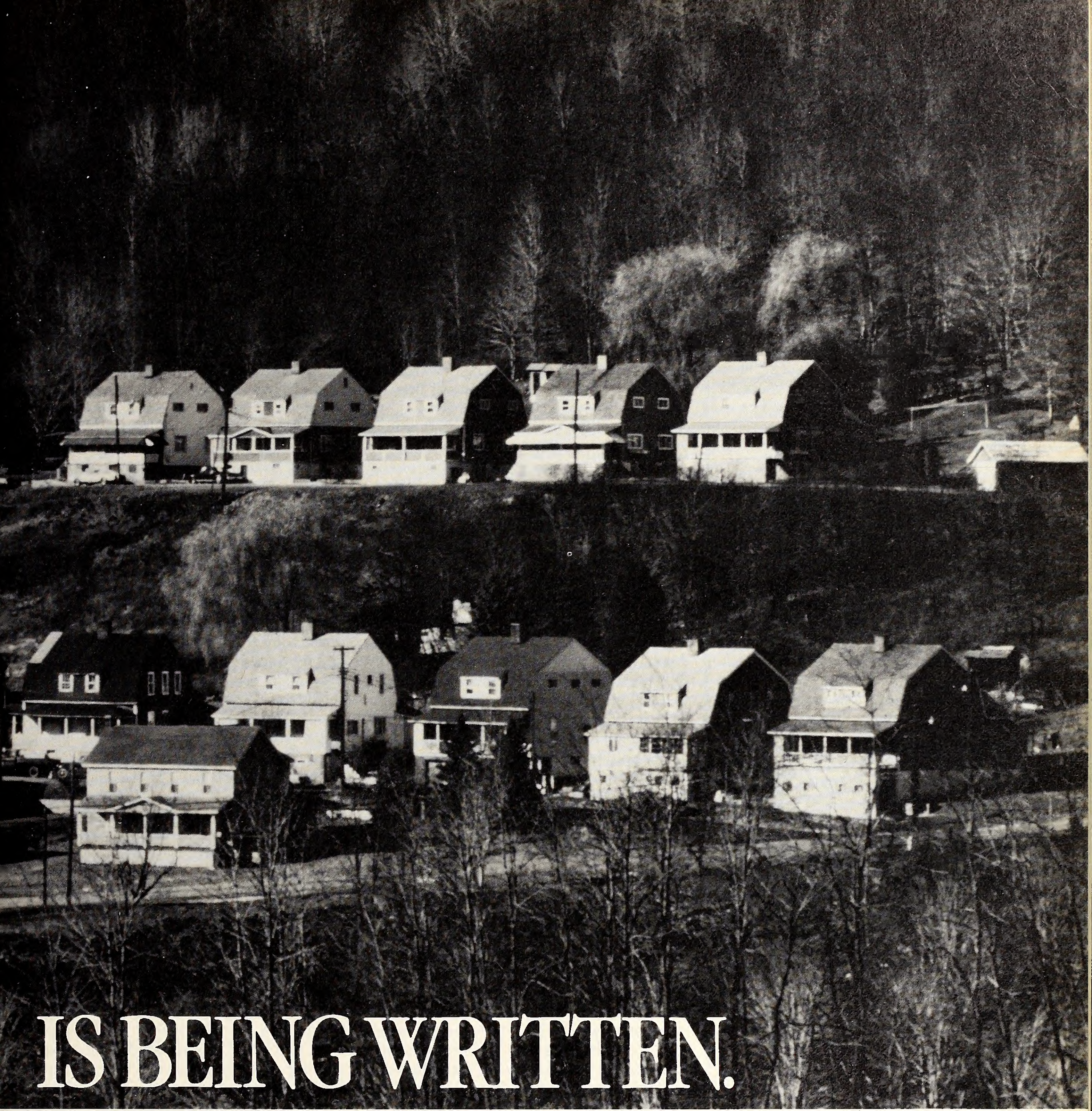
I teach several computer-oriented classes, including a course in Basic and an introduction to data processing, as a part-time instructor at California State University, Fullerton. I have personally found the Self-Teaching Guides (STG) from John Wiley and Sons to be excellent. Their *Basic for Home Computers* is written for Microsoft Basic, which is very similar to Applesoft Basic. The series also includes offerings that cover such topics as 6502 assembly language and the handling of data files on the Apple (the latter comes with a disk).

I have also found *Introduction to Computers and Data Processing*, by Shelly and Cashman, to be valuable. It's published by Anaheim Publishing of Fullerton, California. A picture book with excellent graphics and easy-to-understand text, it's ideal for a beginning course. Students will certainly find it useful.

Cliff Perkins, Huntington Beach, CA

Traveling Consultant

David Austin wrote in the June Open Discussion that he couldn't find accounting software for his wife's travel agency. As part owner and manager of a travel agency, I encountered the same problem when I tried to automate my



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bookkeeping four years ago. Travel agencies require a highly specialized type of accounting, part of which involves a weekly sales summary report required by the Air Traffic Conference, the airlines' central bank. I had trouble just finding a CPA who could understand it all, not to mention finding the right combination of hardware and software to do what seemed to be a simple job. I wound up buying an Apple and writing my own program. I eventually found myself acting as a consultant to other travel agencies with the same dilemma.

Vendors of airline mainframe reservations systems have virtually flooded the market with minicomputer-based accounting systems. These are at prices well out of the reach of small- and medium-sized agencies. The other alternatives are purchasing an in-house microcomputer and software or subscribing to a timesharing service.

There is a jungle of microcomputer software available for travel-agency accounting and reporting. Available packages range in price from $4,000 to $25,000 for a complete system and run on everything from Apples and Altos to Wangs. Some perform only the weekly sales reporting; others are complete accounting systems with versatile payroll and accounts-receivable functions, hotel and car commission tracking, and client record keeping. Some even offer the ability to interface with existing airline reservations terminals, capturing accounting information as each ticket is printed.

Most of these programs were written by agency owners for use in their own businesses, then marketed to other agencies. A few have enjoyed tremendous success because they are flexible and allow for growth. Others have been successful because they are designed after nonconventional but popular manual agency accounting systems such as the ASTA (American Society of Travel Agents) manual accounting system. These require minimal changes in an agency's operations during the transition to automation.

There are currently four or five good packages available for the Apple, with software prices ranging from $800 to $10,000. The best advice anyone can give you is to hire yourself a good consultant. Make sure he has a balanced background in travel-agency management, computers, and accounting. He will help you determine what you need, how much you need it, and how much you should be spending for it. Automation can be the best thing that ever happened to your agency—boosting your productivity and that of your sales agents. It can also be an expensive nightmare, so beware.

Denis D. Du Bose, Phoenix, AZ

Mideastern Applers

In response to Joseph Ben-Israel (June Open Discussion), I have been a dedicated Apple II user for several years now. Last year, I moved to Israel and naturally wanted to bring my Apple system with me. After some checking around beforehand, I was able to determine that an Apple II system can be used on European or Israeli electrical systems (220 volts, 50 Hz) using just a simple transformer. All my equipment was purchased in America and is designed for 110 volts. I now run my entire setup through a single heavy-duty (500 amp) transformer, which simply changes the source current of 220 volts down to 110. This runs my Apple II Plus with two disk drives, a Texas Instruments color monitor, and an Epson MX-80 F/T printer. The Apple and its component drives are not a problem, since it all runs off a direct current line from the power supply anyway. Thus the Apple and the drives are not cycle-dependent. The Epson seems to have no problem with the cycles. The most problematic area is the video display. The Apple generates a standard television-type signal (NTSC) using an RF modulator or can be hooked to a standard monitor with a straight cable. Hooking into an Israeli or European television requires another signal known as PAL and requires a PAL card in the Apple. I used a monitor and forgot about the hook-ups to any television overseas. I did check to see that my monitor is rated as being 50 or 60 Hz-compatible.

Buying American equipment and bringing it with you creates another problem: customs. In some countries this can be quite a hassle. The regulations in Israel, for example, can make importation of such equipment for personal use prohibitive. If you wish, you can eliminate the hassles of customs taxes and regulations, eliminate the problems of electrical transformers, and gain some important advantages by buying the equipment in the country where you will be residing. Apple Computer has dealers all over the world, including Israel. The cost of buying in Israel is higher because of import taxes and low levels of competition among the dealers. The advantage of buying from a local dealer is that you can purchase equipment that has already been modified for the foreign language set of Hebrew. With the flip of a switch, you can access the Hebrew alphabet. Now there is a version of the popular *Apple Writer* program that allows word processing in English or Hebrew.

The software is not generally dependent on the voltage or cycles in any way. Thus, the use of Apple or other vendor software is not a problem overseas as long as the software is rated to the system it is being run on (CP/M requirements, minimum memory requirements, and so forth).

Tamir Weiner, Harei Yehuda, Israel

A Wiry Solution

To Paul B. Brumbaugh: You don't have to rewire your whole house to get a three-wire grounded outlet for your computer. Two-wire supply has one line grounded. It is the same ground line as for a three-wire supply.

Check your circuit-breaker panel. There should be a white insulated wire connected to a water pipe. At each socket, if the wiring was done correctly, the white insulated wire is ground. Sockets have a wide slot and a narrow slot for the prongs of the plug. The wide slot should be the grounded side. It is the same ground as the third, round hole of a three-wire socket. Use an ac voltmeter to prove this for yourself. Sockets have chrome-plated screws for the white wire and brass screws for the black wire. On a three-wire socket the third or ground terminal is usually colored green.

To provide a ground wire for the third terminal, find the nearest water pipe to your computer socket location. Scrape the pipe for good electrical connection and clamp the bare end of a length of white insulated number 14 wire to the pipe. First remove the fuse or circuit breaker for the circuit to your computer. Then remove the currently used socket from the wall and disconnect the wires. Pull the wire from the water pipe through the wall or up through the floor to the opening for your socket. Bend the three wires so that they cannot touch each other or anything else. Replace the fuse or circuit breaker.

Using the voltmeter again, check to be certain that when it's connected to the two white wires there is no voltage reading. Check also to be certain that there's 117 volts between each of the white wires and the black wire. Remove the fuse or circuit breaker before proceeding. Now connect your three wires to your new socket using the color coding described above. The white wire from the water pipe goes on the green terminal of your new socket. Install the socket in the wall box and replace the fuse or circuit breaker.

Check again with the voltmeter. The round hole and the wide slot should give no voltage reading. The narrow slot should show 117 volts (plus or minus 1 or 2 volts) to either the wide

slot or the round hole of the socket. Just for further certainty, try an electric drill or other small appliance having a three-wire plug. Next, get a three-wire-socket expander so you can plug your printer and monitor into the same grounded socket. If the monitor has only two wires, check to see if one prong is wide. If it is, there is no further question. If not, you might want to investigate how it is connected internally. Ask your dealer about that.

Since Open Discussion seems to be a clearing-house for some very important issues, this may be the place to raise one of importance to computer users in particular. The answer just given would not have been needed if local building and electrical codes had been observed by everyone in years past. Manufacturers of low-priced electrical consumer goods have caused the confusion over or lack of understanding of electrical polarity. They like to say that alternating current has no polarity. Theoretically it doesn't, but considering the hazards to people and computers, the grounding requirement must be understood by everyone. It is so basic to ac and so critical that it must be accepted as being as important as the polarity of direct current.
Edward Parker, Baltimore, MD

Purrrrrr
I am writing in response to Robert Buschel's letter entitled "Meeow!" (May Open Discussion). He had rerouted the reset key to run the hello program each time it was pushed. To undo this feature, you must repoke the original values back into the reset vector.

An easy way to do this is to first peek these locations to find their true values before you change them. Then later on you can poke the original values back into where they belong. For example:

```
10 P1 = PEEK (1010):P2 = PEEK (1011)
15 REM POKE IN NEW VALUES
20 POKE 1010,102: POKE 1011,213: CALL
   64367
.
.
.
10000 REM POKE IN ORIGINAL VALUES AT
      END OF PROGRAM
10010 POKE 1010,P1: POKE 1011,P2: CALL
      64367
```

I hope that my suggestions will help with the dilemma.
John Strosnider, Escondido, CA

The Case of the Unwritten File
Regarding Al Goodwin's problem with a file apparently not being written to a disk (June Open Discussion), I have had similar problems. In one case I was writing a fifty-byte entry to a file that was defined as ",L50". The return at the end of the write was the fifty-first character to be written, and that became the first character of the next file. Therefore, an attempt to read the next file gave only a return.

The other time I had the problem I was trying to write to the middle of a record. Even though my command was *print "name";* (please note the semicolon), I found that I either could not close the file or that typing a *print CHR$(13)+CHR$(4)"close"* put a return at the end of what I was writing, and that gave an extra return when I tried to read.

I have found that I can solve disk read/write problems quickly with the use of a utility that lets me read a sector of the file. I like one called *Disk Fixer*, by Image Computer Products.
Raymond J. Schuerger, Pittsburgh, PA

I had a problem like Al Goodwin's, and, after going through many books, the only one that provided the answer was *Apple II User's Guide*, by Poole, McNiff, and Cook.

The last print statement before the control-D must not end with a semicolon or comma. If you use a get statement not followed by a print prior to print control-D, the first character after the get (which might be control-D) is ignored and not executed.

I hope this helps. If it isn't the right answer, I'd appreciate knowing what is.
Martin Waxman, Fairfield, CT

Glad To Help
I am writing to respond to several letters that appeared in the June Open Discussion.

To Dick Rettke: Before I purchased a DOS speedup package, I had heard the same warning you expressed. I have been using *Diversi-DOS* for several months now and I find that, if anything, it is more reliable than DOS 3.3. In a recent comparative review of eight such products, I read that *Diversi-DOS* was the only one that demonstrated significant improvement in save and bsave times. If the others are eliminating the "verify after write" feature, it isn't helping much.

According to that review, *Diversi-DOS* gains its speed in three ways. First, it writes the track/sector list after the whole file is saved. DOS 3.3 updates this list each time a new sector is allocated, resulting in constant movement of the write head and unnecessary delay. Second, *Diversi-DOS* does away with the DOS 3.3 method of reading each sector first and comparing bytes. When you are saving a file or program, you don't care what used to be there. Third, DOS 3.3 uses a one-second delay for drive motor startup before reading or writing to or from the disk. *Diversi-DOS* allows you to shorten this time to a half second. According to the product's manual, ninety-nine percent of all drives will function properly with this delay time. Mine does just fine.

I suspect that the feature you spoke of that allows reenabling is the verify command under *Diversi-DOS*, which differs from the DOS 3.3 verify. This command allows the user to list a file directly from disk to the screen. When used on a text file, it is similar to executing a file with MON I,C,O, but it is a little more useful. When used on a Basic or binary file, it yields some amusing results. It is not, however, a "verify and write."

To Stewart Loving-Gibbard: The instructions for *Diversi-DOS* include the necessary pokes to let you accommodate forty-track

drives. Bill Basham has told me, however, that there is simply not room for Rana's patch for using different drives together.

To Joe Fulford: To select a different drive from within a program, simply type *poke 43624,n* where *n* is the number of the new drive. It will also let you select a new slot in the event you have more than one controller card.

Regarding comments by Adam Taub and William Gentry: Perhaps I do not completely understand the problem that you, especially Mr. Taub, referred to. When program output is sent to a printer, it is printed according to the formatting in your print statements. The only instance in which control-I 80N is necessary is in a program listing. Try the following:

```
10  PR# 1
20  FOR X = 1 TO 80
30  PRINT "-";
40  NEXT X
50  PR# 0
```

When run, this program should produce one continuous line of dashes on an eighty-column printer and two lines of dashes on the screen at the same time. The only reason for using control-I 80N within a program is to disable output to the screen when printing.
Hal Scoggins, Lake Jackson, TX

I am answering Adam Taub's call for help (June Open Discussion). I had the same problem with my Centronics 730 printer, and with the new Prowriter I just bought. Both printers defaulted to forty columns when I couldn't send a "control-I 80N" to the printer. I have *List Handler* from Silicon Valley Systems, but there is no place to enter the special language for eighty columns. I called Silicon Valley Systems, and its customer service department immediately told me what to do.

On the bottom left of the Apple parallel card is a PROM with the number 3410019 on it. This PROM needs to be replaced with one numbered 3410005 (the cost is about $13.50 plus tax at a local computer store—a lot cheaper than a new card). Silicon also told me to disable the line feed on the printer. After replacing the PROM and disabling the line feed, I found that the Prowriter worked perfectly. According to our *Apple Writer II* instruction book, the Centronics printer does not issue a line feed, so you shouldn't have to change anything on the printer. I hope this helps.
Leanna M. Cole, Amarillo, TX

To Matt Capozza (June Open Discussion): When you program with DOS up and running in the machine, there are two ways to transfer output to a card in one of the expansion slots. The first way is to just have the command PR#*x*, where *x* is the slot number. This is what I assume you are doing in your stamp program. The other way is to use DOS's control-D, which would come out as Print CHR$(4);"PR#";*x*. Whenever a command is executed from a program, DOS looks at it before Basic does to see if it was a DOS command (the first PR# is a Basic command, but the second is a DOS command) by checking to see if a CHR$(4) (or control-D, whichever you prefer) preceded it. If there was a CHR$(4), then DOS would reroute output to the device in slot *x*, meaning that DOS commands will still work—with an eighty-column card, for example. If there was not a CHR$(4), then output would be rerouted through Basic to the device, bypassing and therefore "disconnecting" DOS, making text file and other DOS commands inactive. I hope this solves the problem, as I know it can be very frustrating when a program doesn't work the way you want it to.

To Paul Brumbaugh (June Open Discussion): I don't know about the problem in your house, but it is possible to operate your Apple from the 12VDC available in your travel trailer. There are a few companies that make converters that plug into your motherboard or into your power supply. RH Electronics makes an uninterruptable power source called the Guardian Angel that can power a computer, monitor, and printer from a trailer battery, in addition to providing protection from a power outage at home. I think there is also a company that makes just a 12VDC converter that plugs into your motherboard. I don't know the company's name, but I think its product is called Apple Juice. Your local dealer may know more about these, and possibly there are other products that can do the same thing.
Steve Lemke, Santa Barbara, CA

I have been reading *Softalk* since it was less than fifty pages and had a "cute" picture of Darth Vader on the cover. Many times, when I could have responded to a reader's question in Open Discussion, I didn't, thinking that someone else would. After reading through the June issue I found that I knew the answers to many of the questions asked, so I decided to write.

To Paul Brumbaugh: After reading your letter I remembered an ad I saw for a company called Integrated Switching Systems describing a product called Upbus. It contained a built-in monitor with a place to put a disk drive, as well as a rechargeable power supply to run the computer, drive, and everything else. It could also be plugged into a wall circuit, running the computer while recharging its batteries. It's supposed to support an external twelve-volt battery and an adapter for a car.

To Andrew Fishburn: If you have an Epson, you can send the printer the following characters to accomplish your goals: PR#1 (initialize printer), Print CHR$(27)">" (this sets the high [eighth] bit to 1), Print CHR$(27)"=" (this sets the high [eighth] bit to 0).

By sending the first code to the printer, all subsequent values sent will have 128 added to them, allowing you to send values from 128 to 255. The second line switches the printer back to normal, where only values from 0 to 127 will be used.

I have thoroughly enjoyed all the past issues of *Softalk* and I look forward to many more. The only thing the magazine doesn't have anymore that I miss very much are the very heated arguments between readers in Open Discussion about piracy and sexually oriented ads. These letters were better than the daytime soaps on TV! I did recently see one juicy ad in the Classified Advertising section ("Orgy on your disk drive . . ."), and the letters on software piracy seem to be getting hotter, so maybe there's still hope.
David Creemer, Dallas, TX

Convert's Libation
I'm not sure about the conversion of Atari cassettes, but I know where Gregg Johnson (January '83 Open Discussion) can find an article about TRS-80 program conversion. In the premiere issue of *inCider* magazine Hap Gaylord explains how to convert TRS-80 programs to the Apple.
Todd Lutz, Newport, OR

Putting in for a Work Transfer
I am involved with a law firm that uses an Apple II Plus with CP/M—specifically, *WordStar*. Over the years we have generated considerable client data and legal forms on our disks. If we were to change to another computer (such as the IBM pc or a dedicated word processor such as a Wang) would there be services or hardware products that would enable us to transfer work to this other computer without having to retype the data?
Ted Gordon, San Rafael, CA

Teething on an Apple
My husband is a dentist and is considering computerizing his office with an Apple. He needs programs for keeping patient records, recalls, insurance forms, inventory, billing, and the like. I would appreciate seeing any helpful software recommendations in Open Discussion.
Muriel S. Karlin, Staten Island, NY

Apples Revered and Reverent
I would be interested to hear from Open Discussion readers who are using their Apples for church work.
Victor O. Schwartz, Smith Center, KS

Family Feud
Does anyone know of a game that you can both save and turn the sound off on? My dad is hopelessly addicted to *Snack Attack*. Any time he wants to play, he makes me stop using the computer. This is terrible when I am in the middle of a line of programming that I'm trying to figure out. He is also late to some meals because he's "on a roll," and it is very difficult to get to sleep over the sound of the game. It would be okay if he were very good, but his high score is only about thirty-five hundred—well under mine.
Mike Burford, Ephrata, WA

Play It Again, Eh?
Canadian owners of the S.A.M. speech synthesizer have no trouble at all recognizing the accent. S.A.M. is a French-Canadian with a rather bad head cold. Now how in the world did Mark Barton accomplish that? Don't ask.
Edward M. Chilton, Willowdale, Ontario, Canada

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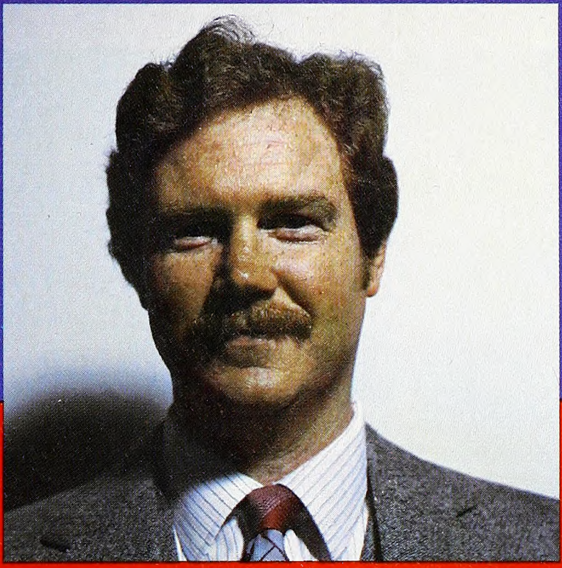
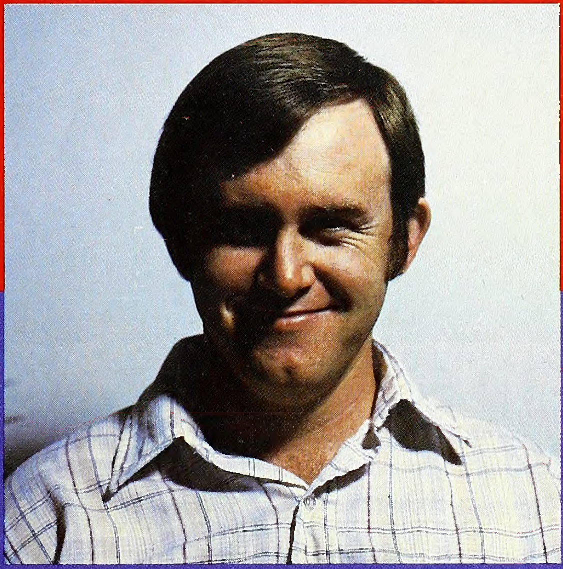
Exec Continental:

AT THE FOREFRONT OF THE REVOLUTION

BY DAVID HUNTER



Tall, physically fit, inwardly composed, Jim Sadlier is one of those smart entrepreneurs who quietly go about their business and make small fortunes. He's a careful observer of the business community and he's patient. As president of both Continental Software and the Book Company, Sadlier is capable of making decisions fast and acting upon them with the same speed.

Initially drawn from the East Coast to California by things other than computers, Sadlier is one of the lucky ones who've struck it rich in the silicon Promised Land. He would probably have succeeded wherever he went.

Stock and Trade. Prior to entering the microcomputer field, Sadlier worked as a floor trader in the securities industry. He is a native of Brooklyn and grew up in New York City. A graduate of Brooklyn College with a degree in economics, Sadlier spent several years working in and around Wall Street before moving to the West Coast in September 1974.

Not a technical person, Sadlier gained his strength from a grounding in business fundamentals and experience acquired while holding a seat on the American Stock Exchange and as a partner in a small brokerage house. In the mid-seventies, as a registered representative for financial institutions, Sadlier first discovered microcomputers.

While working in Merrill Lynch's institutional sales department, Sadlier researched the investment potential of Commodore and its Pet line of products. In early 1977, he traveled to the company to meet with Commodore founders Chuck Peddle and Jack Tramiel. He came to a quick conclusion that personal computers might be the next hot industry.

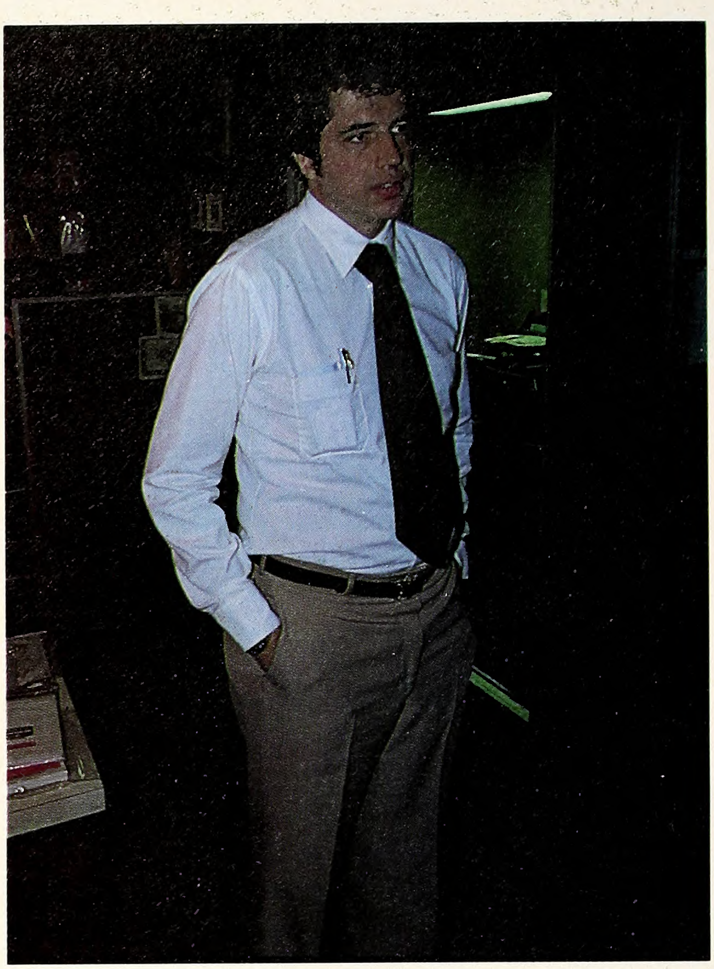
"I got so hyped by the potential of the industry," he says, "that I started looking for a way to enter it."

But how does a Wall Street businessman with no technical knowledge get into the computer industry? Simple, ally yourself with someone who has the expertise and then dazzle everyone with your business sense.

Sadlier saw a magazine ad for a company that was offering a complete turnkey operation for opening a computer store. That company was ComputerLand. After meeting with the firm's cofounder and president, Ed Faber, Sadlier decided that the Sunnyvale, California-based group had the best program he'd heard of for opening a retail store.

The Right Spot. When Sadlier's ComputerLand of South Bay, in Lawndale, California, opened in early 1978, it was the fourth such

Opposite page (top to bottom): Jim Sadlier, president of Continental Software and the Book Company; Hank Scheinberg, Continental's executive vice president and director of marketing; Kathy Farmer, vice president of administration. This page (clockwise from upper left): Mary Watt, vice president of operations; Robert Wells, Ph.D., vice president and publications director for the Book Company; George Rodgers, vice president of purchasing and production; James Densmore, special assignments.


Jim Sadlier—coin collector, softball player, book publisher, retailer, software publisher, and financial wizard.

franchise store in southern California. It was a risky operation; computer stores started up and failed by the hundreds in the late seventies and early eighties. But Sadlier chose his location wisely—a strategic spot south of Los Angeles near affluent suburban Palos Verdes, industrial parks, and such high-technology firms as TRW and Northrop.

To compensate for his own lack of technical expertise, Sadlier relied on ComputerLand and hired knowledgeable people to work in the store. From the start, ComputerLand of South Bay was a successful venture.

When Sadlier first opened the store, it was practically a microcomputer supermarket—carrying Imsai, Northstar, Cromemco, and Apple products. As more low-priced systems like the Apple II came out, the technical hobbyist community was drawn to microcomputers. Later the market would shift to small business and would fast approach the mass consumer stage.

The shifting market trends of the microcomputer industry, reflected in the day-to-day business transacted at his store, was something that Sadlier was trained to watch. With his foot in the door of the industry, he began peering inside and gathering information.

Above all else, he listened to the customers at his store. What did they like and dislike? What did they not understand? After a couple of years of observing, Sadlier believed he knew the answers to some of these questions.

Sadlier identified two areas that caused customers the most problems—a lack of good information about software, and the fact that there was little good software to begin with. In 1980, he began thinking of ways to address these needs of the market.

A Local Meeting Place. ComputerLand of South Bay was much more than just another outlet for microcomputer products. It was a meeting place, a temple for the lost and weary in the early days of personal computing. Sadlier became a wise leader and some of his customers formed a skilled and loyal following.

When he began developing his first product, *The Book of Apple Software* (published by the Book Company), Sadlier naturally turned to his more knowledgeable customers for contributions to the collection of software reviews. One of these was Jeffrey Stanton, a programmer and general computer whiz. Stanton wrote many reviews for the first *Book of Apple Software,* as well as editing a large portion of it.

Two early customers, Kathy and Mike Farmer, became friends of Sadlier. One day they came into the store and listened to Sadlier complain at length about what a hassle all the store's paperwork had become. "I told him I *love* to do paperwork," says Kathy Farmer. "He said, 'You're hired.' "

Sadlier, Farmer, Stanton, and a high school student, Pam Nowatka (who worked part-time in the store), shipped the first copies of *The Book of Apple Software* out of a storefront located next to the South Bay ComputerLand. It was a modest beginning. Then Sadlier turned his attention to software.

Bob Schoenberg and Steve Pollack were two would-be programmers when they first met Sadlier through the ComputerLand store. Sadlier had noticed that Apple's *Checkbook* program seemed to sell well. He could never stock enough copies of it. He also remembers listening to the comments of users of that program.

"They said, 'I wish it could do this and I wish it could do that,' " recalls the nontechnical Sadlier. Well "this and that" is what Sadlier, Schoenberg, and Pollack agreed upon as the basis for the *Home Money Minder*—the earliest precursor of *Home Accountant,* which sold for $34.95 in late 1980.

Twins. Sadlier formed the Book Company and Continental Software at the same time. Both were risky propositions, perhaps more risky than opening a computer store. Even more challenging was trying to make the transition from seller to producer—a transition that few have managed successfully.

Sadlier decided to give it a go and experiment. He reasoned that listening to customers and following his business sense and the advice of individuals like Softsel's founder Bob Leff—Sadlier first met Leff back when the now-giant distribution company was being run out of Leff's apartment—ought to ensure success.

It has, and Sadlier is not surprised.

"Could I imagine the success Continental would have? Yes. I've looked at the historical perspective, the life cycles of many different industries. I know how fast they can explode and grow. Computers are similar to space technology. I've seen it a lot of times."

This is not to say that starting up two companies has been easy or that Sadlier didn't do a lot of experimenting in the beginning. In the summer of 1980, Sadlier was the first software publisher to place an order for an ad in *Softalk*'s premier issue. His modest half-page black-and-white ad for Continental Software was bordered by American flags and stars and began with the headline, "Revolutionary Programs from Continental Software for Your Apple Computer." (Sadlier chose the name Continental Software because he is a serious collector of coins and artifacts dating back to the time of the Continental Congress.)

That first ad plugged five programs—*L.A. Land Monopoly, The Mailroom, Hyperspace Wars, Home Money Minder,* and *General Ledger.*

In those days, the game market was not dominated by a half-dozen or so companies the way it is now. Sadlier, like a hundred other software publishers, tried his hand, with limited success. *Monopoly, Hyperspace Wars,* and later games like *3-D Skiing* were grand experiments, but Sadlier knew when he was outclassed. Except for *Guardian* and *Cross Country Rallye,* both of which appeared in the summer of 1982, Continental has pretty much left games to the games companies.

Sadlier is first and foremost a businessman, so it's not surprising that Continental has concentrated almost entirely on financial and business software for the home and the small business. What's surprising is how well the company has succeeded with only a limited number of products. Credit goes to Sadlier and his business philosophy, shared by those who work closely with him.

Sadlier cultivated the art of listening to the owners of *Home Money Minder* and *The Mailroom,* just as he had listened to customers in the retail store. He believes that the relationship with the customer is crucial,

for this is the best way to find out what is lacking in a product. And improving a product is the best way to keep making money.

Home Accountants. In early 1982, Schoenberg and Pollack teamed up with Larry Grodin to bring out an updated *Home Money Minder*, changing the product's name to *The Home Accountant*. Few will contest the success that the new-and-improved *Home Accountant* has achieved in the Apple market. Since late 1981, either as *Home Money Minder* or as *Home Accountant*, the program has been a regular on *Softalk*'s Top Thirty Bestseller list. Through the early part of this year, the program was firmly rooted in the top five, outpaced only by such heavyweights as *VisiCalc* and *Apple Writer II*. It reached number two last month, finally unseating *VisiCalc*.

The Mailroom became *1st Class Mail* in late 1981, and then metamorphosed again early this year into *FCM* with added features, such as the ability to merge *FCM* files with word processing files.

Perceiving a need for a good tax program, Sadlier brought out *Tax Advantage* in late 1982. Although it didn't outsell more established products, *Tax Advantage* made a decent showing in the market. You can bet that Sadlier and company are listening closely to the program's owners, planning for next year's update.

Two years ago, the Book Company and Continental Software were still fairly small-time operations. Once *Home Accountant* and *1st Class Mail* started to sell in large numbers, the two companies began to outgrow the confines of the storefront next to the ComputerLand.

Sadlier moved the expanding Book Company and Continental into a momentarily spacious office suite near the Los Angeles International Airport. The two companies, seemingly overrun with talented and qualified personnel, are now bursting the walls of that location and are actively seeking more space.

Dynamic Duo. Hank Scheinberg, executive vice president and director of marketing for both Continental and the Book Company, and Jim Sadlier have known each other for close to ten years. They have common roots—years on Wall Street—and the same quick-as-a-Minuteman business instincts.

A graduate of Trinity College in Connecticut, Scheinberg was raised in a small farm town in rural eastern Long Island. He spent sixteen years on Wall Street in institutional sales and research. Sadlier says that Scheinberg is good at spotting trends, at "knowing what's going to be hot."

Scheinberg moved to southern California in the early seventies and got into a hot industry—real estate. He continued investing and eventually became an executive of one of the largest real estate firms in the state. Scheinberg met Sadlier on a tennis court in Marina del Rey back in 1974 and the two have been friends ever since.

Once again, Scheinberg is certain that he's gotten into a hot industry. Though he is another nontechie, Scheinberg knows plenty about marketing. He has done a first-rate job, quadrupling Continental's sales while competing with the best of them—Apple Computer, Broderbund, and VisiCorp.

"Basically, Jim comes up with the products, and I get them out the door," says Scheinberg. Actually, as many as fifty other people are involved in the process, but the power at the top is split between Sadlier and Scheinberg, who are now co-owners of Continental and the Book Company.

Scheinberg, who was into real estate for seven years, feels that computers are going to be a long-lived trend. He quotes John Naisbitt, author of *Megatrends*: "It isn't the Hula-Hoop."

According to the Book. The managerial role of minding the Book Company has been taken on by Dr. Robert Wells, who has been with the company for about a year. Prior to joining the Book Company, Wells was a professor at Edinburgh University in Scotland—the same school at which he earned a Ph.D. in English lit.

Currently, Wells is responsible for overseeing the Book Company's growing line of publications catering to several different personal computers. One of the biggest tasks facing Wells and his staff is wading through the large amounts of information for the annual updates of *The Book of Apple Software* and its sister publication for the Atari computers.

"We're gaining ground all the time," says Wells. "We know our audience better each time around. But it's still a hell of a lot of work."

Following through on Sadlier's original idea of providing useful information about software, Wells makes no bones about *The Book of Apple Software*'s policy of not running advertising. "We're out to inform the consumer, not please the manufacturer," says Wells. "We don't do inhouse reviews and we don't pay our reviewers. They keep the program as payment. We try to keep the reviews consumer-minded and very fair."

Working with Wells is Sandra Rochowansky, who earned the master's degree in English at UCLA. Through a friend of hers, Rochowansky got into writing documentation for the computer industry, eventually finding her way to the Book Company a little over a year ago.

Currently, Rochowansky is working on a number of projects, including finding suitable reviewers, acquiring new products for review, and attending to administrative details.

Bookmeister. Jeffrey Stanton, author of the book *Apple Graphics & Arcade Game Design*, is a consulting editor at the Book Company and is rarely seen in the office nowadays. He's usually at home working hard on any of a number of projects.

Jim Densmore (or J.D., as he's called by many) is a sharp individual in charge of a very important facet of Continental's operations. Continental's ninth employee, Densmore has been with the company for more than two years. He began in the shipping and receiving department and served a six-month stint in customer support. He now handles special assignments, which means a little of everything.

Of primary importance is Densmore's overseeing of the alpha and beta testing phases before a product is released. He is one of the first to be fully aware of the quality of a product and frequently interfaces with the customer support and marketing departments. Densmore also works with authors, developing programs and enhancing existing products. He sees himself as responsible for ensuring the quality of a program before it hits the market.

Just this past May, Gerald Lewis was appointed Continental's direc-

If you could run your program up to 20 times faster, would it be such a terrible thing?

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And what could be bad about that?

The Einstein Compiler™

Einstein.

The genius of simplicity.

An Einstein Master Program™

Some computer programming knowledge necessary. *Applesoft is a trademark of Apple Computer Inc.

tor of software development. He screens and evaluates new programs being considered for publication. Prior to joining Continental, Lewis was an independent systems analyst and software documentation consultant for such companies as Standard Logic.

Lewis, Densmore, and marketing manager Denny Mosier are the three one-person departments at Continental. According to the official press release, Mosier is responsible for research, advertising, public relations, planning future software programs, and supporting existing products.

Master of Marketing. Mosier joined Continental early this spring; in the past, he's been an account executive with Simon/Public Relations, a high-tech public relations firm, and an L.A.-based correspondent for *Electronic News*, a trade publication.

Mary Watt is Continental's vice president of operations. Watt left a career in banking for an entry-level job in the computer industry. She found it at Continental in June of 1981. In those early days, Watt, Kathy Farmer, and Pam Nowatka for the most part ran the whole show—the business and administrative side of the company.

Currently, Watt is responsible for overseeing customer service and the all-important day-to-day order entry operations. Nowatka works in accounts receivable and has the title of assistant to the vice president of administration. She can still recall that first shipment of *The Book of Apple Software* in 1980; she remembers when Continental Software was "a gleam in Jim and Kathy's eyes."

Like Sadlier and Farmer, Nowatka seems to have adjusted well to Continental's continued growth. The company now has close to sixty full-time, in-house employees, as well as a fluctuating number of temporary helpers.

Continental's vice president of purchasing and production, George Rodgers, has been with the company since February 1982. His department of seventeen is the largest in the company, occupying a large shipping area in the back of the building.

Rodgers and his department went through their toughest trials last Christmas. *Home Accountant*, *FCM*, and particularly *Tax Advantage* had high end-of-the-year sales and Rodgers says the workload kept everybody jumping.

Where To Go for a Tune-up. Continental's customer service department employs seven people full-time. Customer service manager Rich West says the department gets between fifty and sixty phone calls a day. On the average, one out of every twenty inquiries requires expert, technical advice. Most of the others concern simple questions that are usually answered in the manuals.

Peter Castillo runs what is called "the information desk" at Continental. A new service, the information desk is designed to relieve the customer service and sales departments. Castillo answers order and order-entry questions before the product is in the user's hands.

Last, but not least, Continental has a crack sales staff. With more than twenty-two hundred dealers across the nation, regional sales managers Tere White, Barbara Ring, and Stephanie Loysen work hard to keep in constant contact with the marketplace. They've been joined recently by Penny Olender, Jennifer Bartel, Sally Hammer, and Mike Hilton.

Sadlier is a good leader of this group. He's serious but also approachable.

"It's always tough to find really good people," he says. "Achieving the right chemistry, a successful company personality, is a team effort."

So far Continental and the Book Company are winning the game. A fast tour through the offices of the two companies reveals a hard-working, happy bunch of people. The atmosphere often extends beyond the office to employee get-togethers and coed softball games.

If Sadlier feels much pressure being the president of two companies in the still highly volatile and highly unpredictable microcomputer industry, he doesn't show it. He's confident, for a number of reasons, that Continental and the Book Company are here to stay.

Market Watch. First and foremost is his faith in the practice of studying the marketplace and coming up with new products that meet a pressing demand. Second is his philosophy of taking existing products and improving them based on feedback from customers and dealers. Third is his belief in bringing out only those products that jibe with his existing product line. It's not likely you'll see too many graphics utility or word processing programs coming out of Continental in the foreseeable future.

Sadlier is also a firm believer in being able to react fast to a changing market. It's an advantage he claims over larger companies that make "decisions by committee."

In the future, Continental and the Book Company will build on their present product lines, creating in some cases "families of products," says Sadlier. There will be many more books, software with an accounting flavor, and possibly educational software.

"Around the turn of the century, there were three or four hundred companies in the automobile industry," says Sadlier. "Cars became a big part of our lifestyle, and the same thing is happening with computers today. But that doesn't necessarily mean that only a half dozen of the hundreds of computer companies around today will survive."

The industry will continue to evolve; there will be a shifting of the ranks from time to time and not everyone will make it. Sadlier is confident his companies can keep pace.

"We will be a survivor."

Buttonwood Apples

BY KEN LANDIS

We've spoken a lot in the past about fundamental analysis. This month, we'll look at our first piece of fundamental analysis software, the *Dow Jones Market Microscope* from Dow Jones and Company. But before we get started, just what is fundamental analysis?

In this context, the term *fundamental* essentially means basic. Whereas the technical indicators used in technical analysis are based on trends in the price or volume of a particular security, fundamental statistics are concerned with basic indicators of corporate or industry performance. Therefore, fundamental analysis considers such things as quarterly earnings, debt/equity ratio, and what the dividend stream looks like; it also attempts to determine how these factors may affect performance.

The two most popular forms of fundamental analysis are *ratio analysis* and *variance analysis*. In ratio analysis, you compute what percentage one number is of an aggregate number. A corporation's debt/equity ratio is a good example to consider. Let's assume that XYZ company has $50,000 worth of debt outstanding and a total equity capitalization of $100,000. This means that the company's debt/equity ratio is 50,000/1,000,000, or .5. In other words, 50 percent of the capitalization of the company comes from debt.

What significance this has depends on the industry or business you're looking at. In order to determine whether a debt/equity ratio of .5 is good or bad in a particular instance, you'd have to research the comparable figures for that business or industry. (If you invest, then, the lessons to be learned here are "Don't judge a book by its cover" and "Remember, all books are different.")

Variance analysis shows how things change. Have sales increased or decreased over the last five years? What about earnings and other relevant factors? Variance analysis quickly isolates growth or contraction trends and gives some idea where a company might be headed.

Now that we have a clearer idea of what fundamental analysis is, let's look at this month's program.

Dow Jones Market Microscope, Dow Jones and Company (Box 300, Princeton, NJ 08540; 609-452-2000). $699.
Backup policy: two disks included.
System requirements: 48K Apple II (with language or Applesoft card), Apple II Plus or IIe, or Apple III, two disk drives. D.C. Hayes Micromodem II or a modem with an acoustic coupler, RS-232 Communications Interface Card or Super Serial Card, eighty-column card.

In the past, investors who wished to use a microcomputer to follow fundamental indicators had to collect information by hand from *Barron's*, the *Wall Street Journal*, a local newspaper, or one of the electronic publishing services (such as Dow Jones, CompuServe, or the Source). They then entered it into a database or spreadsheet program, and once that was done a variety of analyses became possible.

By contrast, as you may have surmised, the *Dow Jones Market Microscope*, like the rest of the Dow Jones software family, obtains information by means of the Dow Jones News/Retrieval Service. In fact, it's not possible to enter information into the system by hand. Some potential users will consider this a major drawback, but it should be pointed out that Dow Jones carries a plethora of financial information, statistics, and corporate information. It's doubtful that this information could be collected manually at less cost, let alone in less time.

To get started using the *Market Microscope*, you must first supply the program with the information it needs to function (such as what type of printer and modem you have and what slots your peripherals are located in). Because you'll be using the Dow Jones News/Retrieval Service, you must also enter your local Telenet and Tymenet numbers and your Dow Jones ten-character password. Once this information is stored on the program disk, *Market Microscope* can connect you to the Dow Jones News/Retrieval Service automatically.

After logging on to the system, you tell *Market Microscope* which network you want to use (Telenet or Tymenet) and the local access number; from there, it does the rest.

One of the more interesting customizable features in this part of the

program is the time-out option. Time-outs are the amount of time the computer will stay connected to Dow Jones when you aren't requesting information from the remote computer. *Market Microscope* has a preset time-out limit of ninety seconds; this limit can be extended to three, six, or nine minutes. The time-out option helps you avoid unnecessary time charges.

Once you've initialized a data disk, you're ready to begin creating the files that will update stock prices and give you the information you need in order to perform your fundamental analysis. The first thing to do is to select a set of indicators from one of two Dow Jones databases. The Media General database includes information on dividends, price-earnings ratios, and stock price performance of thirty-two hundred companies listed on the New York and American Stock Exchanges and selected over-the-counter companies. Information on one hundred eighty different industries is also included. The Corporate Earnings Estimator database contains the consensus forecasts of earnings per share (drawn from the estimates of one thousand research analysts and forty-five major brokerage firms) for twenty-four hundred companies.

To help you select the indicators you want to use, *Market Microscope* will scroll through a list of the sixty-eight available indicators on the Apple's display. Scrolling is controlled by means of the left and right arrow keys, and when an indicator you want to use appears, you simply depress the space bar to mark it. Once you've gone through the list, you can review your selections by scrolling back through. The indicators you marked earlier will be highlighted.

Saving your choices to disk is done by depressing the dollar-sign key (shift 4). This unique key choice is used throughout the program and helps avoid the accidental saving of information that might occur if this function were linked to the return key or to escape.

Having saved the information you're going to use in analyzing the stocks in your portfolio, you must tell *Market Microscope* what those securities are. This is done by creating a stock list or an industry list. A list is a file of stocks that are updated by the indicators. The nicely laid-out catalog screen shows how many lists are on file. You can choose a previously created list or create a new one.

Market Microscope uses two types of lists, industry and special. An industry list is composed of stocks within the same Media General industry group. (For example, Apple, IBM, Control Data, and Tandy are all computer stocks, and the Media General industry group that contains the indicators on these companies is number 170—Computers, Systems, and Peripherals.) A special list is made up of an assortment of industry groups or an assortment of stocks from different industry groups.

The program differentiates between an industry list and a special list by the file name or identifier it assigns. Industry lists are given three-digit numbers, all of which are included in the appendix of the user manual. Special lists start with an S, followed by two digits chosen by the investor.

Having chosen the indicators you want to use in your analysis and the stocks you wish to analyze, you're ready to request information from Dow Jones. You're asked whether you want to update all stock and industry data or only part of it, as well as which lists you want to use. As soon as *Market Microscope* has this information, it activates your modem, dials, and connects you to the Dow Jones News/Retrieval Service. It then automatically gets and stores all of the indicators and stock prices you requested. When the Apple's memory fills up, the program instructs the Dow Jones computer to stop sending, saves the information in memory to disk, and then restarts the Dow Jones computer. As soon as everything you want has been saved to disk successfully, the program automatically disconnects you from Dow Jones. Now you're ready to begin your analysis.

Market Microscope offers two analysis techniques. In the first—the "screen stocks and industry groups analysis"—the program screens the lists you've prepared and issues a buy or sell recommendation based on your criteria. In the second technique, called a "price alert," *Market Microscope* scans your lists, identifies each stock that meets criteria you've established for twelve parameters, and issues the appropriate recommendation.

To use the screen stocks and industry groups analysis technique, you must define your analysis criteria by establishing buy or sell screens. These screens consist of a maximum of sixteen indicators out of the possible twenty you selected earlier. (The current price and last day's volume information can also be included as criteria.) The indicators can be scrolled through on the Apple's display the same way that they were when you originally chose them. Since they'll appear on the printed analysis report in the order they were chosen, you'll want to select indicators in the order of their relative importance to your investment decision.

You're also required to select a ranking order (high to low or low to high) to control the sorting of the information on the printed report; in essence, you're choosing an ascending or descending sort. You must also supply the limits of the sort. For example, selecting the indicator "52-week high price" and then specifying a high to low sort tells the program that you're interested only in stocks that have a 52-week high greater than $25. (A limit need not be specified, but having one is helpful in many forms of analysis.) This limiting feature acts as a filter that allows the program to omit from the report stocks that you wouldn't be interested in. If an industry composite figure is listed in the file you retrieve, you can request that the software use it as a limit.

Let's assume you've just created a sell screen. When you run the selling analysis, *Market Microscope* will pass through the list you selected and test each stock against the screening criteria. Once that's done, the program will begin printing out the screening report (this report won't display on-screen, however). The complete report consists of the results of the screening, criterion by criterion. The stocks will be ranked high to low or low to high, whatever you chose earlier. The limit you selected, along with the industry composite figure, will also be displayed. Any stock that exceeded any of the criteria you chose will be separated from the rest of the group by a symbol.

You have your choice of printing the entire screening report or just the rank matrix. The rank matrix is a graphic representation of the analysis, in which the horizontal axis represents the indicators that were used for the analysis and the vertical axis shows the stocks that were analyzed. Each entry is ranked numerically on the left-hand side of the matrix, while the right-hand side shows whether a given stock meets or beats the limit set. Two other pieces of information are shown at the bottom of the rank matrix—the number of stocks that meet or exceed the limit selected and the total number of stocks compared.

Using the price-alert feature requires that you define the alert points, or changes, in the price-alert indicators that you consider significant. Doing this entails setting the support and resistance prices and the values for the twelve price-alert tests. These tests use the support and resistance prices in their calculations. The percentage movement parameters in each test are input and controlled by the investor. Together, they provide investors with the price-alert checks identified in the list below. The program's reporting precedence hierarchy ensures that the most important movements are reported first and that movements that neutralize one another are not reported.

Price-Alert Checks

Up-break alarm—tests to see if the stock price has moved up the percentage supplied by the investor.

Down-break alarm—tests to see if the stock price has dropped the specified percentage.

Resistance-price update—if the price of the stock does move over the alert percentage specified, the resistance price will be updated to reflect the new condition.

Support update—if the price of the stock falls below the specified percentage, the support price will be updated to reflect the new condition.

Support-level buy recommendation—this reflects a movement over the support price but below the resistance price. The investing assumption is that the price will "rebound" from the support level, making the potential return sufficient to warrant investment consideration. If the condition is met, a buy recommendation will be issued.

Breakout buy recommendation—if the stock price exceeds the resistance level and exceeds the support level, a recommendation to buy the stock will be issued. The investment assumption is that the stock price has broken out of its previous pattern and will continue to rise.

Resistance-level sell—if the current price of the stock is less than the resistance level and above its support price, *Market Microscope* will issue a recommendation to sell the stock short. The investing assumption is that the

price will move downward from the resistance price enough to cover the investment.

Breakout sell recommendation—if the current price of the stock is below its support-level percentage and less than the resistance-level percentage, a short-sell recommendation will be issued. The assumption is that the price of the stock is falling to a new resistance level.

Market Microscope provides a full range of easy-to-use and well-documented data-editing utilities to accommodate users who make mistakes or change their minds. These include *delete*, *rename*, *add*, *edit*, and *view*. The package also offers a Dow Jones E-Z Terminal mode, which is used to access Dow Jones for information other than that used by the *Market Microscope* during updates. E-Z Terminal has a fifteen-thousand-character buffer that stores information in memory. Investors can select the information they want saved and send it to disk. This ability, coupled with a formatting feature that makes information on the Apple's display easier to read, makes E-Z Terminal a nice added feature.

For those times when you just want to know the current price of a stock you're following, *Market Microscope* can print out an alphabetical listing of all stocks being carried on the system. This report tells you which list the stock resides in (in case you want to use the view feature to see all the indicators), the current price, and the support and resistance prices that are labeled *trading range*. After the alphabetical stock list has been printed, a second report is generated. It shows all the lists on disk arranged alphabetically, the last date each list was updated, and the date the indicators were set. The last date updated is critical—you may be looking at a report that contains month-old prices; making a decision on the basis of an out-of-date report could have unpleasant consequences.

A Few Bugs. *Market Microscope* does have a few problems. If you are unsuccessful in an attempt to log on to Dow Jones and then you go on to the main body of the program, *Market Microscope* won't remember to disconnect your modem. Your phone will be busy for however long you continue to work with the program, but you may not realize it. In addition, you can carry only one set of indicators per disk, so if you want to judge the performance of various lists of stocks against different indicators, you must put them on different data disks. In the long run, of course, this will cause you to develop a disk-management problem. It would be preferable if investors could link the stock lists to different indicators if they wanted to.

Market Microscope also limits you to one buy and one sell screen per data disk. Disk-management problems are likely to come up here as well and the solution should be obvious: The program's authors have written wonderful menu routines and would do well to use them here also to allow users to make the appropriate selections.

Also, when you run the price-alert feature, you can choose only one list at a time or a set of lists. When working with a data disk with lots of lists on it, you'll wind up sitting there a pretty long time, typing in the list number each time you run price alert. Again, it would be much nicer to be able to take advantage of the menus that were developed for other parts of the program.

On the plus side, the screens used in the program are well thought out and well executed and the program is well error-trapped. In addition, *Market Microscope* performs all of its functions in a reasonable period of time.

The program documentation is clear, well done, and nicely typeset. There are a few errors and omissions, but all in all it's a professional job. And, of course, Dow Jones has an 800 help line for users of the Dow Jones News/Retrieval Service and Dow Jones software. If they won't support you, nobody will.

So, should you buy *Market Microscope*? If you believe in fundamental analysis, have the money to spend on Dow Jones News/Retrieval Service updates, and can afford the price of the program, the answer is yes. It's the first major fundamental package on the market, and it will probably set the standard by which all future fundamental packages are judged.

Because of the massive and diverse amounts of data involved in fundamental analysis, especially what's required by the techniques used in this program, fundamental analysis isn't the easiest way to analyze investment alternatives. Is it the best? That you must decide.

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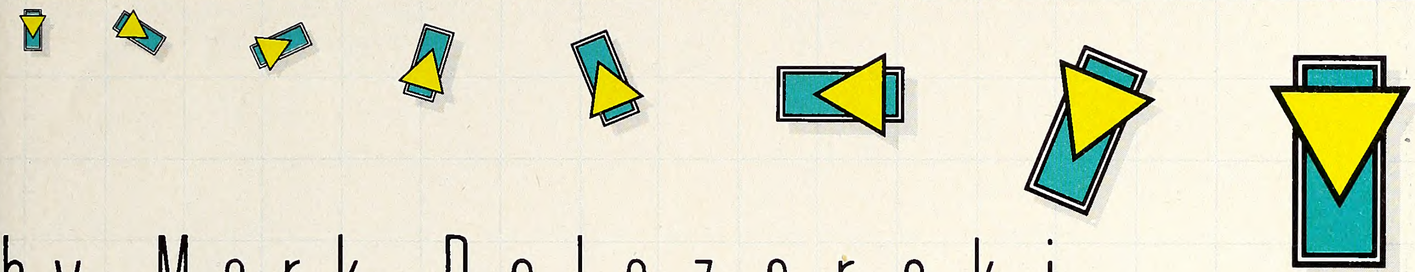


by Mark Pelczarski

Last month we discussed techniques for creating and viewing three-dimensional objects on a two-dimensional computer screen. This month we'll work with a Basic program that uses techniques of scale, rotation, and linear perspective to allow you to do exactly that.

With this program, you can enter the coordinates of points of intersection for a 3-D line drawing and then enter data indicating which dots to connect with the lines. Then you can view your object, rotate it in three dimensions, move it and scale it, stretch and compress it, and save it to and load it from disk.

Remember, the program's written in Basic, so you shouldn't expect animation speed. What you can expect, however, is a good introduction to how 3-D figures can be handled on a computer.

We'll use the calculations discussed last month, which resulted in the equation:

$$PX = \frac{X * ID}{ID + Z}$$

translated into Basic form for our program. The calculation for projecting a 3-D coordinate onto the two-dimensional screen can be found in lines 840 through 860. (Note that the values used are coordinates, not distances, as in the formula. Therefore, *ID−Z(I)* in lines 840 and 850 is actually the distance between ID and Z, since one of the values is negative and the other positive.) The calculations for moving the figure in each direction are in lines 1290 through 1310. The scaling calculations are in lines 780 through 810, and the rotation calculations are in lines 740 through 760. The rest of the program is essentially window dressing, allowing you to enter, edit, save, and load your figures and to make your choices.

The only other section that's interesting from a mathematical standpoint is that from lines 970 through 1080. Although this section looks complex, it's actually just broken down into cases. These instructions perform the calculations necessary for "clipping." When a line is ready to be drawn, what happens if one of the endpoints is off the physical screen? The easy options are not to draw it at all (even though half or most of it might actually be in the visible range) or to have the endpoints wrap around (this creates a real mess, but it's fast).

The best way visually, although it is slower, is to figure out where the line would have gone off the screen and then to use that as the endpoint instead of the point that was off the screen. The calculations for clipping use the slope of the line to figure the point at which the line should end. Note also that we're using a coordinate system that has the origin (0,0) in the middle of the screen, with X and Y increasing to the right and up respectively. Therefore, when the line is drawn in line 1100, it recomputes the coordinates to fit Apple's (0,0) in the upper left, with Y increasing downward.

A Breakdown of the Program. We've been talking conceptually about three-dimensional graphics up to now. The program breakdown that follows, and the accompanying list of important variables, should be useful to anyone who wants to modify the program or analyze it in greater depth.

Lines 10−30 initialize the arrays and variables.

Lines 40−80 give and act on the main editing choices.

Lines 90−230 allow you to list and edit the coordinates and lines in your figure.

Lines 240−440 let you save a 3-D file or read one from disk.

Lines 450−490 let you save the screen image from your projected object as a picture file.

Lines 500−560 allow you to enter the points and lines for a new figure.

Lines 570−680 compute a center for the figure by finding the largest and smallest X, Y, and Z coordinates and then averaging each pair.

Lines 690–820 contain the rotation and scaling formulas for movement. The variable C is set for the type of movement in lines 1180–1240.

Lines 830–870 project the 3-D coordinates into the two-dimensional plane of the monitor screen.

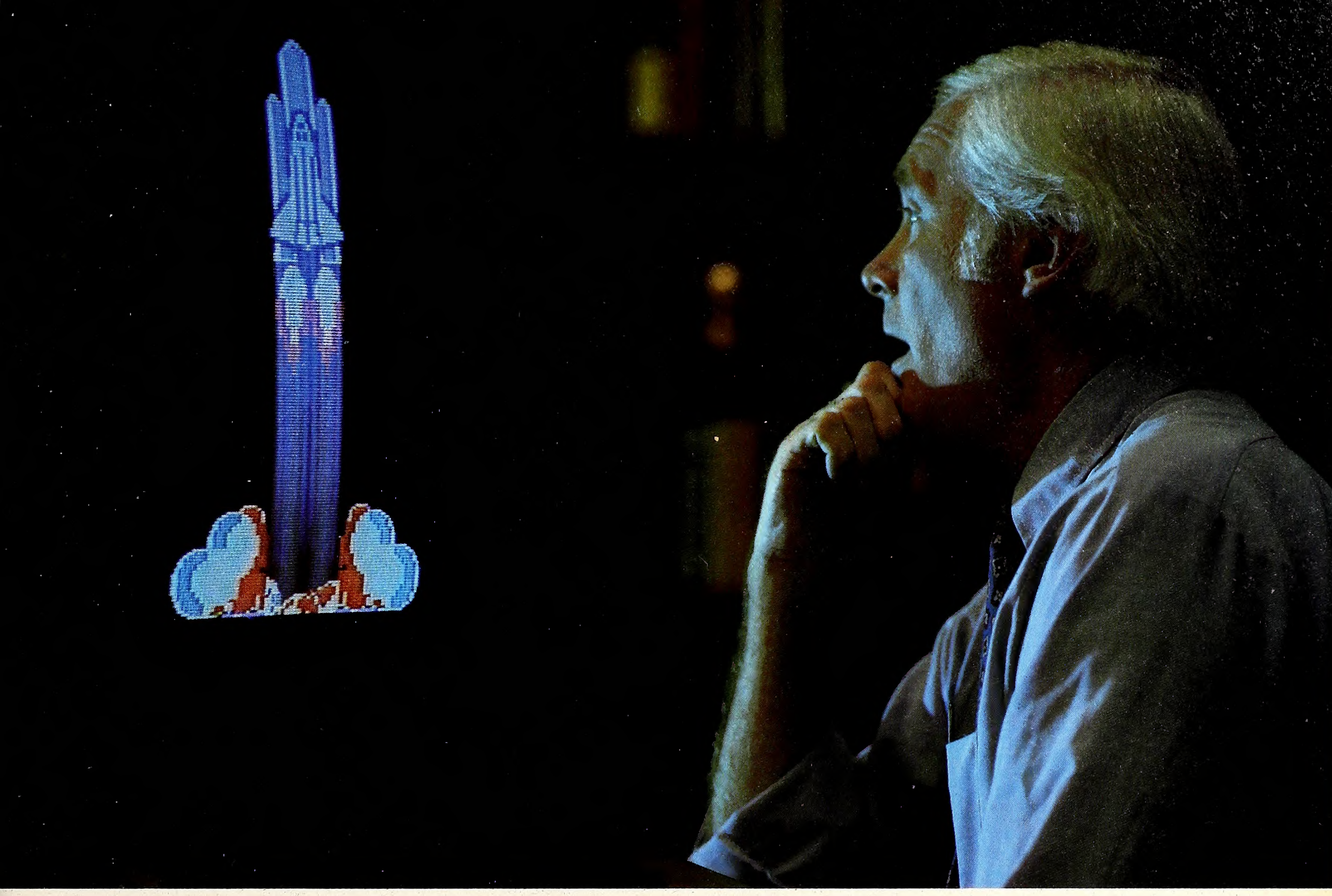
Lines 880–1110 take the projected points, scale them to viewing size, and then draw the lines of the figure on the screen.

Lines 1120–1390 get the operation that you want to perform and the parameters of the operation, if necessary, and usually jump back up to line 700 to redraw.

3-D Program Variable List

A$	A general input string.
AN	Numeric quantity, used for angle of rotation and for number of units to shift an object.
C	Numeric input choice.
C1	Cosine of angle of rotation.
I	Generally a loop counter.
I1	Another loop counter.
ID	"Eye distance," as discussed last month.
K	Intermediate multiplier used in finding projected points.
L%(*n*,*m*)	Integer array of line endpoints. Up to 749 lines can be used. Note that the zero element of the second dimension is used, so the endpoints for line 5 are stored in L%(5,0) and L%(5,1).
M	Multiplier for scaling.
NF	Number of figures, 0 or 1.
NL	Number of lines.
NP	Number of points.
PX(*n*)	Projected X values.
PY(*n*)	Projected Y values.
S1	Sine of angle of rotation.
SW	A switch variable, used in 130–190 to tell whether lines or points are being edited and in 910–1100 to tell whether a line is entirely off the screen.
VS	Viewing scale.
X(*n*),Y(*n*),Z(*n*)	X,Y,Z coordinates of your figure.
XC,YC,ZC	X,Y,Z coordinates of center.
XH,YH,ZH	Largest X,Y,Z coordinate values.
XL,YL,ZL	Smallest X,Y,Z coordinate values.
XP,YP	Interim computational values used for clipping.
XR(*n*),YR(*n*)	Scaled X,Y projected coordinates, used in preparing line display.
XT,YT,ZT	Temporary X,Y,Z coordinate with center subtracted off, used in rotation and scaling computations.

```
10  LOMEM: 16384: HGR
20  DIM XR(1),YR(1),X(500),Y(500),Z(500),L%(749,1),PX(500),
    PY(500)
30  NL = 0:NP = 0:ID = - 100:VS = 3:D$ = CHR$(4)
40  HOME : VTAB 21: PRINT "1-CREATE FIGURE, 2-EDIT
    FIGURE": PRINT "3-VIEW, 4-START OVER": PRINT "5-SAVE
    ON DISK, 6-GET FROM DISK": PRINT "7-SAVE
    2-DIMENSIONAL IMAGE, 8-QUIT";
50  INPUT C: IF C < 1 OR C > 8 THEN 40
60  IF NOT NF AND C > 1 AND C < 6 THEN PRINT : PRINT "THERE
    IS NO FIGURE IN MEMORY.": PRINT "PRESS ANY KEY";:
    GET A$: GOTO 40
70  ON C GOTO 510,100,580,30,250,350,460,80
80  TEXT : END
90  REM EDIT FIGURE
100  TEXT : HOME
110  PRINT "1-POINTS,2-LINES,3-CHANGE,4-DONE
     EDITING";: INPUT C: IF C < 1 OR C > 4 THEN 110
120  ON C GOTO 130,160,190,40
130  PRINT "#,X,Y,Z:":S1 = 0:SW = 0: FOR I = 1 TO NP
140  PRINT I;: HTAB 8: PRINT LEFT$ ( STR$ (X(I)),6);: HTAB 16:
     PRINT LEFT$ ( STR$ (Y(I)),6);: HTAB 24: PRINT LEFT$ ( STR$
     (Z(I)),6):S1 = S1 + 1: IF S1 = 20 THEN PRINT "PRESS A KEY";:
     GET A$:S1 = 0: PRINT
150  NEXT : GOTO 110
160  PRINT "#,FROM,TO":SW = 1:S1 = 0: FOR I = 1 TO NL
170  PRINT I,L%(I,0),L%(I,1):S1 = S1 + 1: IF S1 = 20 THEN PRINT
     "PRESS A KEY";: GET A$:S1 = 0: PRINT
180  NEXT : GOTO 110
190  IF SW THEN 220
200  INPUT "POINT #";I: IF I < 1 OR I > NP THEN 110
```



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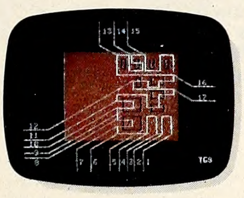

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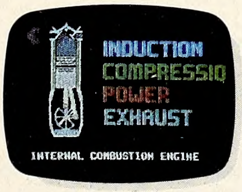

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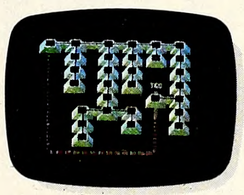

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```
210 INPUT "X:";X(I): INPUT "Y:";Y(I): INPUT "Z:";Z(I): GOTO 110
220 INPUT "LINE #";I: IF I < 1 OR I > NL THEN 110
230 INPUT "FROM #";L%(I,0): INPUT "TO #";L%(I,1): GOTO 110
240 REM SAVE 3-D FILE
250 ONERR GOTO 440
260 INPUT "NAME : ";A$
270 PRINT D$;" OPEN";A$
280 PRINT D$;" WRITE";A$
290 PRINT NP: PRINT NL
300 FOR I = 1 TO NP: PRINT X(I): PRINT Y(I): PRINT Z(I): NEXT
310 FOR I = 1 TO NL: PRINT L%(I,0): PRINT L%(I,1): NEXT
320 PRINT D$;" CLOSE"
330 POKE 216,0: GOTO 40
340 REM READ 3-D FILE
350 ONERR GOTO 440
360 INPUT "NAME : ";A$
370 PRINT : PRINT D$;" OPEN";A$
380 PRINT D$;" READ";A$
390 INPUT NP: INPUT NL
400 FOR I = 1 TO NP: INPUT X(I),Y(I),Z(I): NEXT
410 FOR I = 1 TO NL: INPUT L%(I,0): INPUT L%(I,1): NEXT
420 PRINT D$;" CLOSE"
430 POKE 216,0:NF = 1: GOTO 40
440 PRINT "DISK ERROR"; PEEK (222): PRINT "PRESS ANY KEY";:
    GET A$: POKE 216,0: GOTO 40
450 REM SAVE PICTURE
460 ONERR GOTO 440
470 INPUT "NAME : ";A$
480 PRINT D$;" BSAVE";A$;",A8192,L8192"
490 POKE 216,0: GOTO 40
500 REM CREATE FIGURE
510 NF = 1: HOME : TEXT : PRINT "TYPE 'D' OR 'DONE' WHEN NO
    MORE POINTS.": ONERR GOTO 520
520 PRINT "POINT #";NP + 1: INPUT "X:";A$: IF LEFT$ (A$,1) =
    "D" THEN 540
530 I = VAL (A$):NP = NP + 1:X(NP) = I: INPUT "Y:";Y(NP): INPUT
    "Z:";Z(NP): GOTO 520
540 PRINT "TYPE 'D' OR 'DONE' WHEN NO MORE LINES.": ONERR
    GOTO 550
550 PRINT "LINE #";NL + 1: INPUT "FROM POINT #";A$: IF LEFT$
    (A$,1) = "D" THEN POKE 216,0: GOTO 40
560 I = VAL (A$):NL = NL + 1:L%(NL,0) = I: INPUT "TO POINT
    #";L%(NL,1): GOTO 550
570 REM FIND APPROXIMATE CENTER
580 XH = - 999:YH = - 999:ZH = - 999:XL = 999:YL = 999:ZL =
    999
590 FOR I = 1 TO NP
600 IF X(I) < XL THEN XL = X(I)
610 IF X(I) > XH THEN XH = X(I)
620 IF Y(I) < YL THEN YL = Y(I)
630 IF Y(I) > YH THEN YH = Y(I)
640 IF Z(I) < ZL THEN ZL = Z(I)
650 IF Z(I) > ZH THEN ZH = Z(I)
660 NEXT
670 XC = (XL + XH) / 2:YC = (YL + YH) / 2:ZC = (ZL + ZH) / 2
680 C = 4
690 REM COMPUTE NEW POINT COORDINATES
700 FOR I = 1 TO NP
710 IF C = 4 THEN 840
720 X(I) = X(I) - XC:Y(I) = Y(I) - YC:Z(I) = Z(I) - ZC:XT = X(I):YT =
    Y(I):ZT = Z(I)
730 ON C GOTO 740,750,760,840,770
740 YT = C1 * Y(I) + S1 * Z(I):ZT = C1 * Z(I) - S1 * Y(I): GOTO 820
750 XT = C1 * X(I) - S1 * Z(I):ZT = C1 * Z(I) + S1 * X(I): GOTO 820
760 XT = C1 * X(I) - S1 * Y(I):YT = C1 * Y(I) + S1 * X(I): GOTO 820
770 ON S1 GOTO 790,800,810
780 XT = M * X(I):YT = M * Y(I):ZT = M * Z(I): GOTO 820
790 XT = M * X(I): GOTO 820
800 YT = M * Y(I): GOTO 820
810 ZT = M * Z(I)
820 X(I) = XT + XC:Y(I) = YT + YC:Z(I) = ZT + ZC
830 REM TRANSLATE TO 2-D
840 IF ID - Z(I) > - .001 THEN K = 10000: GOTO 860
850 K = ID / (ID - Z(I))
860 PX(I) = K * X(I):PY(I) = K * Y(I)
870 NEXT
880 REM DRAW FIGURE ON SCREEN
890 HGR : HCOLOR= 7
900 FOR I = 1 TO NL
910 SW = 0
```

```
920  FOR I1 = 0 TO 1
930  XR(I1) = PX(L%(I,I1)) * VS:YR(I1) = PY(L%(I,I1)) * VS
940  NEXT
950  FOR I1 = 0 TO 1
960  IF SW THEN 1090
970  IF ABS (XR(I1)) < = 139 THEN 1040
980  IF ABS (YR(I1)) < = 95 THEN 1010
990  IF YR(0) = YR(1) THEN 1070
1000  YP = SGN (YR(I1)) * 95:XP = (YP - YR(1)) * (XR(0) - XR(1)) /
      (YR(0) - YR(1)) + XR(1): IF ABS (XP) < = 139 THEN 1080
1010  IF XR(0) = XR(1) THEN 1070
1020  XP = SGN (XR(I1)) * 139:YP = (XP - XR(1)) *(YR(0) - YR(1))
      / (XR(0) - XR(1)) + YR(1): IF ABS (YP) < = 95 THEN 1080
1030  GOTO 1070
1040  IF ABS (YR(I1)) < = 95 THEN 1090
1050  IF YR(0) = YR(1) THEN 1070
1060  YP = SGN (YR(I1)) * 95:XP = (YP - YR(1)) * (XR(0) - XR(1)) /
      (YR(0) - YR(1)) + XR(1): IF ABS (XP) < = 139 THEN 1080
1070  SW = 1: GOTO 1090
1080  XR(I1) = XP:YR(I1) = YP
1090  NEXT
1100  IF NOT SW THEN HPLOT 140 + XR(0),96 - YR(0) TO 140 +
      XR(1),96 - YR(1)
1110  NEXT
1120  REM GET NEXT OPERATION
1130  HOME : VTAB 21: PRINT "1-ROTATE, 2-SHIFT, 3-SCALE
      OBJECT,": PRINT "4-DISTORT, 5-NEW CENTER, 6-SCALE
      VIEW": PRINT "7-EDIT, SAVE, OR QUIT, 8-FULL SCREEN";
1140  INPUT C: ON C GOTO 1210,1260,1180,1170,1340,1390,40,
      1370
1150  GOTO 1130
1160  REM SCALE FIGURE
1170  PRINT : INPUT "1-WIDTH, 2-HEIGHT, OR 3-DEPTH?";S1:
      IF S1 < 1 OR S1 > 3 THEN 1170
1180  IF C = 3 THEN S1 = 0
1190  INPUT "MULTIPLY BY? ";M:C = 5: GOTO 700
1200  REM ROTATE
1210  HOME : VTAB 21: PRINT "ROTATE 1-UP, 2-DOWN,
      3-LEFT, 4-RIGHT,": PRINT "5-CLOCKWISE,
      6-COUNTERCLOCKWISE ";: INPUT C: IF C < 1 OR C > 6
      THEN 1210
1220  INPUT "ANGLE (0 - 180) ? ";AN: IF AN < 0 OR AN > 180
      THEN 1220
1230  AN = 3.14 * AN / 180: IF INT (C / 2) * 2 < > C THEN AN =
      - AN
1240  S1 = SIN (AN):C1 = COS (AN):C = INT ((C + 1) / 2): GOTO
      700
1250  REM SHIFT
1260  HOME : VTAB 21: PRINT "SHIFT 1-LEFT, 2-RIGHT,
      3-DOWN, 4-UP,": PRINT "5-CLOSER, 6-FARTHER ";:
      INPUT C: IF C < 1 OR C > 6 THEN 1260
1270  INPUT "HOW MANY UNITS? ";AN: IF INT (C / 2) * 2 < > C
      THEN AN = - AN
1280  ON INT ((C + 1) / 2) GOTO 1290,1300,1310
1290  XC = XC + AN: FOR I = 1 TO NP:X(I) = X(I) + AN: NEXT :
      GOTO 1320
1300  YC = YC + AN: FOR I = 1 TO NP:Y(I) = Y(I) + AN: NEXT :
      GOTO 1320
1310  ZC = ZC + AN: FOR I = 1 TO NP:Z(I) = Z(I) + AN: NEXT
1320  C = 4: GOTO 700
1330  REM NEW CENTER
1340  PRINT "POINT # (1-";NP;") ";: INPUT C: IF C < 1 OR C > NP
      THEN 1340
1350  XC = X(C):YC = Y(C):ZC = Z(C): GOTO 1130
1360  REM FULL SCREEN
1370  POKE - 16302,0: GET A$: POKE - 16301,0: GOTO 1130
1380  REM SCALE VIEW
1390  INPUT "MULTIPLY BY? ";M:VS = VS * M:C = 4: GOTO 700
```

This is Mark Pelczarski's last Graphically Speaking for Softalk*; it appears that the more penguins you have, the more time it takes to keep them frnk-frnking. Then, too, we all must sometimes choose one value over another. Undoubtedly, for Pelczarski, the fame of authorship gave way to the glory of athletics; he covets the miniature-golf water-hazard championship of the world.*

Gone is not forgotten, though; Pelczarski will continue on as advisory editor for Apple graphics and golfing for Softalk.

Starting next month, beginning at the very beginning, Softalk*'s graphics columnist will be a programmer you may have heard of and whose face you've certainly seen—everyone's favorite phony beginner, pinball champ Bill Budge.*

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VENTURES WITH VISICALC

BY JOE SHELTON

As you may know, VisiCorp announced *VisiCalc Advanced Version* for the Apple IIe at the National Computer Conference in May. This month, we'll examine the features that make *Advanced Version* a very useful addition to your software library. We'll discuss most of the new features as well as their use in template design.

The Apple IIe. First a note about the IIe. Introduced in January of this year, the IIe brings a number of enhancements to the Apple II. For example, the IIe can be expanded to 128K of memory (from the maximum of 64K on the Apple II). Like the Apple III, the IIe provides a number of other features that make it perfect for *VisiCalc*. For example, it offers an eighty-column display (as an extra-cost option), meaning that you can have almost twice as many columns (and characters) displayed on-screen at once. In addition, the IIe offers four directional arrow keys, allowing you to move throughout the spreadsheet easily without having to use the space bar to change cursor direction.

If you use *VisiCalc* often, you know of some things you would like changed or features you would like added to make the program more useful. In the four years since the original *VisiCalc* appeared, hundreds of people have written VisiCorp requesting changes. Well, the folks in San Jose have been listening. *Advanced Version* incorporates almost every important change that had been requested. In fact, short of simplifying the user interface, they left out only one major feature that was commonly requested: the ability to enter text across cell boundaries.

VisiCalc Advanced Version's new features include variable column-width capability, new formatting options, a variety of new @ functions, keystroke memory, and some new print-formatting options.

What You See. Perhaps the most common complaint against the original *VisiCalc* had to do with column widths. You couldn't vary column widths in the original program (you could change column widths, but all the columns within a given window had to be of the same width). Since many templates require, or at least could benefit from, individually adjustable column widths, this was a significant deficiency. *Advanced Version* has corrected the deficiency.

In the new program you can set individual column widths to whatever sizes you desire—from 1 to 125 characters per column.

While the original *VisiCalc* contains a number of formatting commands (initiated with /F or /GF), many people recognized the need for still more. *Advanced VisiCalc* has answered this need and provided practically every formatting option you can imagine. These new commands involve the setting of attributes.

Advanced Version retains the original formatting options, thereby ensuring that templates developed on earlier versions of the program will still run. Any template developed on another Apple version of *VisiCalc* can be loaded into *VisiCalc Advanced Version* with no changes or problems.

The reverse obviously isn't true. Because *Advanced Version* has many new features, templates developed on *Advanced Version* may not run on earlier versions. On the other hand, they may: it depends on what you have in the template. When *VisiCalc* loads a file, it beeps whenever it encounters an error—an unknown command or function. It continues to load the template in such cases, however. You may find that your template has been loaded and works correctly, although the new *Advanced Version* features and functions won't be available.

Attributes cover a number of other useful capabilities, in addition to providing formatting enhancements. By setting attributes appropriately you can now hide data, display the formulas (instead of their calculated results), control the kind of data that may be entered at designated cells, and ensure that certain entries will not be changed. You can also set up specific cells as tab stops; pressing the tab key moves the cursor from tab stop cell to tab stop cell.

VisiCorp has added a new term to the *VisiCalc* vocabulary: *gutters*. This word comes from printing technology and refers to the left and right margins for text or values displayed in individual cells.

Most of the attributes can be applied either to individual cells (with /A or to an entire window (with /GA).

The attribute options are listed in table 1.

What It Does. There isn't a plethora of new functions in *Advanced Version*, but what new ones there are can be extremely useful, especially

Attribute	Function
Expression	Displays formulas instead of results
Hide	Hides data in cell (data is still visible on edit line)
Modify	Controls type of data entry (number, value, or text)
Tab	Sets a tab stop
Label	
<	Aligns text flush-right
>	Aligns text flush-left
L	Sets left gutter
R	Sets right gutter
F	Sets a repeating label (equivalent to the /– command)
C	Centers label within a cell
Value	
<	Aligns value flush-left
>	Aligns value flush-right
L	Sets left gutter
R	Sets right gutter
+	Displays plus sign before positive value, minus sign before negative value
–	Displays minus sign before negative value, no sign before positive value
(	Displays negative values in parentheses
C	Displays CR (credit) to the right of negative value, DR (debit) to the right of positive value
	Inserts commas into numbers every three digits
	Displays values with decimal point
Z	Suppresses trailing zeros with /AVF
%	Multiplies value by 100 and displays percent sign
$	Displays dollar sign before value
G	Invokes general format
F	Specifies number of decimals displayed
I	Displays integers only
S	Displays scientific notation only
*	Displays integers as asterisks for use in bar graphs

Table 1.

for certain kinds of financial analysis.

The original version had only one financial function: net present value. *Advanced Version* offers six.

Five of the six form an interrelated group. These are @RATE, @PERIODS, @PMT, @PV, and @FV; the last two of these stand for present value and future value respectively. To calculate any one of these functions, you specify three of the remaining four functions as arguments. For example, to calculate an interest rate, you enter the function @RATE followed by the number of periods; then you provide two of the remaining arguments—payment, present value, and future value.

The sixth new financial function (@IRR) calculates internal rate of return, based on an initial investment and a range of cash flows.

Calendar Functions. Hand in hand with the new financial functions comes the facility to determine exactly how many years, months, or days there are between two dates. *Advanced Version* offers three groups of calendar functions. The first (@MDY) converts dates (in the format month,day,year) into the number of days elapsed since January 1, 1979. @VMDY does the same as @MDY, with one exception. @MDY allows negative values; it converts a −1 in the month field, for example, to November of the preceding year (a 0 would be translated into the previous year's December). @VMDY checks for valid data—that is, positive numbers within appropriate boundaries.

The second group of functions—@DAY, @MONTH, and @YEAR—do the inverse of the first group. They convert an absolute date into a calendar date. An absolute date is some number of days since (or before) the system's base date; January 1, 1979.

The last group is similar to the first two but deals with hours, minutes, and seconds. @HMS is similar to @MDY, and @HOUR, @MINUTE, and @SECOND are similar to the year, month, and day functions.

Other Functions. There are a number of other new functions as well.

@LABEL turns text into something that is treated as a value. In plain language, this means that an @IF function can now display text as well as values. So a stock analysis template can now be constructed that will display "Buy!" or "Sell!" rather than just numerically indicating some financial criteria. The @LABEL function is also useful for report formats where you might require the same information in a variety of places in the same template. Instead of having to enter a date numerous times, for example, you can get by with entering it only once; @LABEL will pick it up for you anywhere else in the sheet that you need it.

@VALUE is similar to @LABEL, but it guarantees that a function will return a value and not a label.

@LCHOOSE is similar to @CHOOSE, but it looks up a list of labels and displays the label corresponding to the value entered.

@MOD is shorthand for the arithmetic term *modulo*; this function calculates the remainder after one value is divided by another.

@DOTPROD calculates the sum of products of corresponding entries in two ranges.

@ROUND permits you to round values to specified precisions. Positive arguments in the function cause rounding to the right of the decimal, while negative arguments round to the left.

How You Do It. There is just one new command (aside from attributes), but there have been important changes to five other commands. The differences are as follows.

Keystroke memory (/K) is the same as on the Apple III version but is new to the Apple II *VisiCalc*. As we said a year ago, this may be a sleeper that will prove very useful as people learn what they can do with it.

What *can* they do with it? Keystroke memory offers an easy way to automate things you do often, especially those activities that involve many separate steps. There are two methods of setting up a keystroke memory command. You can automatically record the steps as you actually do them, or you can enter the steps much as you would if you were writing a program. The result is the same. Pressing three keys (control-S and the specified alpha character) plays back all the steps you've recorded. The keystroke memory even offers the facility for inserting prompts, time delays, and more.

There is a slight difference between the IIe and the III versions. The IIe version uses control-S to begin execution of a keystroke memory sequence, while the III version uses control-K. The reason for the difference is that control-K generates a character that has a different function on the IIe and thus isn't available for use.

VisiCorp touts keystroke memory as a way to simplify consolidations of different templates. In May 1982 we voiced our concern about the appropriateness of this method of consolidation. A year later, the same concern still exists. You must be fairly knowledgeable to be able to set up the templates for consolidation (see Ventures with VisiCalc, September 1982, for more on consolidations). That isn't to say that it can't be very useful for consolidations. It is! It's just a bit more difficult than you might be led to believe.

Keystroke memory can also be used for many other things. For example, you could use it to generate a simplified training program. You could set up versions of your templates and have keystroke memory automatically explain how the templates work and how to operate them.

Or you might program up to twenty-six different macros, each accomplishing a different operation with only two keystrokes. You might have some keys defined for printing different areas, others for setting up specific displays with windows and titles, and so on.

Printing. It's always been a pain to print templates in *VisiCalc*. If your template was larger than a single page, you had to print each section separately onto a different piece of paper. *Advanced Version* offers a number of printer options that format the printout and provide for the eventuality of templates larger than a single page. When you try to print a model larger than a single page, the program first prints the first page, does a form feed to get to the next page, then begins printing the second page, and so on.

Sadly, the people who designed the program seem to have forgotten that not all of us use fan-folded paper. There's no way to stop continuous printing at the end of each page. If you don't have a continuous-feed printer, you'll still have to print your templates a page at a time. And even if your printer does handle fan-folded paper, if you want your template printed lengthwise on an 8½-by-11 page, you'll still have to print each section manually.

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The new printer options are initiated with /PS (for printer setting). They're shown in table 2.

Setting	Function
L	Removes or adds carriage returns for your printer
B	Divides large templates onto numerous pages
T	Prints titles on each page of the printout
#	Numbers pages sequentially
P	Specifies number of printed lines per page
W	Specifies number of characters across a printed page
F	Specifies total number of lines per page
M	Specifies left-margin position
S	Allows you to enter a setup string for your printer

Table 2.

There's one additional glitch that's really a pain. You cannot set and then save the printer settings. That means that each time you boot *Advanced Version* you have to reset the printer options manually in order to print. It would have been simple to allow you to save your printer settings in a master printer file or with each template. VisiCorp chose not to do so.

Replication has always been one of the most useful and powerful *VisiCalc* commands. But it had some weaknesses. The major problem was that you couldn't replicate blocks of cells. You had to replicate single rows or columns until you had completed replicating an entire block. Now you'll be able to replicate blocks as well. This can be very useful and timesaving. If your model requires a number of sections, you have only to complete a single section and then replicate it into as many other sections as you need.

Replication can also be very useful for reorganizing a template. For example, suppose you have decided you want a section (block) located in a different part of the template. Now you can effectively move it. Replicate the block to the new area, blank the original, and you have moved the section. The only thing you have to be careful about is ensuring that any formulas that reference into the original block are updated to reference the new cell locations.

In addition, you now have the option of replicating attributes only. Remember the time you completed a template and entered your data, only to realize that you should have set the dollar format in many of the cells? You had to go back and individually enter /F$ into all those cells, or replicate all the cells again with the new format. The new replicate command allows you to replicate attributes by themselves without affecting the cells' contents.

Inserting and deleting rows and columns could be a laborious task if you had many to add or remove. You can now insert or delete more than one row or column at a time with a single command. All you have to do is specify how many columns or rows are involved. To add five rows to a template, for example, you hit /15R return. One word of warning: You have to be careful when deleting; once you've started a deletion, you lose all the rows or columns specified. If you delete too many, you'll have to reenter the information (or reload the template from disk if you've saved it).

Clearing a model is now slightly more complicated than it used to be. You now have printer settings and keystroke memory to consider. There are times that you'll want to clear and load a new template without having to reenter printer settings or keystroke memory commands. /CY still clears all data, but in addition it clears both printer settings and keystroke memory options. /CAY just resets the worksheet characteristics (printer options and so on), leaving the data alone. /CSY clears data and formats, while leaving keystroke memory and printer settings.

Now you have some idea how powerful and useful the new features in *VisiCalc Advanced Version* are. Think about how they might be combined to give you more useful templates. Think about how you can print more professional-looking reports. Think about how much easier it can be to design, complete, and use templates. Take it from those who use it, *VisiCalc Advanced Version* is so powerful that you'll never go back to the standard version.

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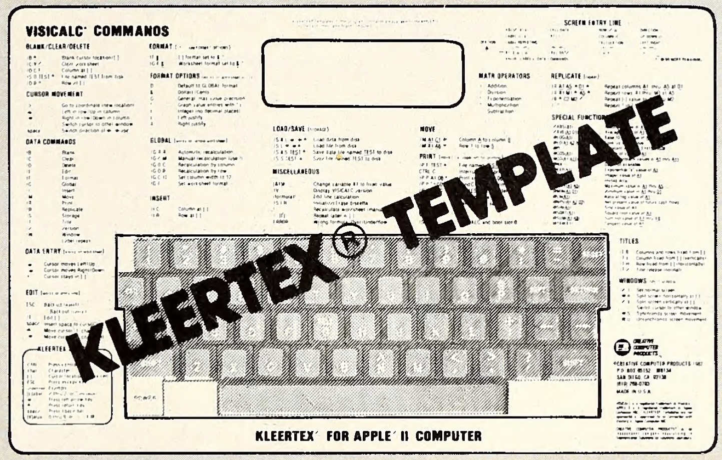

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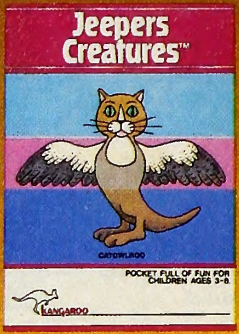

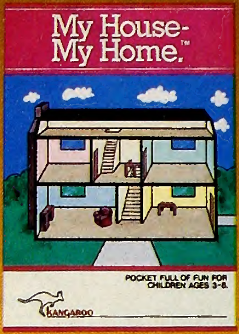

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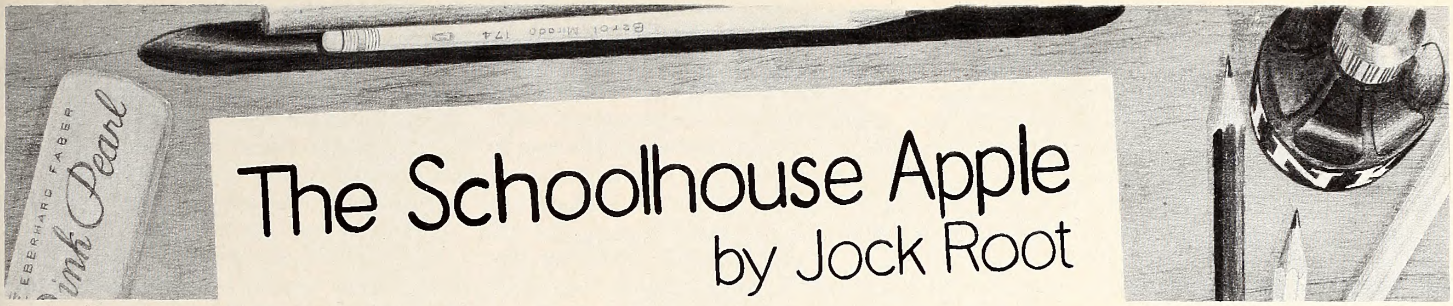

The Schoolhouse Apple
by Jock Root

Have you read Heinlein or van Vogt? They wrote some of the great science fiction of the golden age—the forties. Not space opera, like *Star Wars*, but *serious* stuff, food for thought. They're the kind of stories in which the hero might come across a sign like this, in the year 2057 or so:

> A New Public Library Service
>
> Computers fill our everyday lives. We find them at the bank, the grocery store, and even at the library circulation desk. We need to become increasingly computer-literate as this electronic trend gains momentum.
>
> Toward this goal, many schools, including the Liverpool School District, have purchased microcomputers and developed courses for their students.
>
> Our patrons now have access to a powerful microcomputer at no charge. Library-owned programs may be used, or patrons may write their own.
>
> To learn what the computer can do for you, read this brochure, then attend one of our orientation-validation sessions. Ask at the circulation desk for the current schedule.

But this isn't science fiction; in 1983, it's fact: It appears on the cover of a brochure from the Liverpool Public Library in Liverpool, New York. The library has a 48K Bell & Howell Apple with a disk drive and a color television set as a monitor. People with valid library cards can use the system for up to two thirty-minute periods per week.

There's a variety of software available for the system, including math, logic, and spelling skill games; simulation programs in science and history; a fantasy adventure game; and a course in Basic programming. You can bring work disks of your own or buy them from the library.

Now the citizens of Liverpool have more access to an Apple than most of those who live in the Big Apple itself!

ComputerTown. Another idea that could have come from a science-fiction story is actually doing quite nicely in the real world. It's the ComputerTown concept. Science fiction has often favored the attitude that "if you need something, get together with your neighbors and create it"; and, if what your community wants is computer literacy, the ComputerTown approach sounds like a pleasant way to make it happen.

The first ComputerTown was established in 1979 in Menlo Park, California, by Bob Albrecht and Ramon Zamora. The two were writing books on elementary programming and wanted to learn something about the people they were writing for—computer beginners. So they took a computer to a local school and gave a demonstration class once a week. The students were fascinated and wanted to try using the computer themselves between demonstrations. Eventually, space was set aside in the Menlo Park Public Library, where several computers and a collection of software were made available by Zamora and Albrecht for use by the whole community.

The demonstration classes were carried over into the new setting. At first they were held once a month; then, in response to growing demand and community participation, weekly classes were instituted. There were classes for both adults and children. The adult classes concentrated on how to use the system as a convenient tool, while the classes for children emphasized the fun there can be in learning and thinking. There were also workshops and seminars in more advanced areas for experienced computer users.

This public access computer literacy project was so successful that the National Science Foundation became interested in it and gave Zamora and Albrecht a grant to develop a detailed model of the Menlo Park project as a guide to other communities. The model has been described in the new book *ComputerTown—A Do-It-Yourself Community Computer Project* from Reston Publishing Company.

Many communities haven't waited for the book though. Working from earlier versions of the model, at least one hundred fifty ComputerTown affiliates have sprung up in the United States and abroad. In the meantime, the original Menlo Park site has been used by more than ten thousand people.

Zamora and Albrecht believe that this concept—and the increase of computer literacy in general—will have a profound effect on the structure of the educational process. More and more academic work will be done at home (the same fate others have predicted for various business activities), and the schoolroom experience will focus on socialization training, exercise, and play. Sounds like science fiction again, doesn't it?

The Apple for a Teacher. We all know what a great entertainer the Apple is—with science fiction, fantasy, and arcade games too numerous to mention. It's easy to forget that the computer is a teacher even when it's playing games. Any game, even the simplest, requires some learning in order to play it and, in most of the interesting ones, the learning doesn't stop there. At the very least, there is logic and vocabulary training in the simulation and adventure games and psychomotor coordination training in the arcade games.

Those elements will get to you, even if you aren't trying to learn from games, even if you actively avoid programs that are intended to teach; if you aren't trying to avoid them, just look and you'll find some very entertaining teaching games out there. There are simple drill programs in elementary math and English, intermediate-level programs that teach logical analysis and problem-solving, and adult programs to cover the range from rote learning (such as touch-typing or foreign language vocabulary) to such complex intellectual behaviors as programming in Basic and playing chess.

And there's another kind of teaching that happens around an Apple—teaching that has nothing to do with academic work. The machine represents so much capability—so much computing power directly under the user's control—that there is an inherent challenge to *use* it for something.

In Seattle, for example, home of the Apple Pugetsound Program Library Exchange, or A.P.P.L.E., for short, all kinds of remarkable things are happening. At Lakeside, a private school in the area, some four hundred students share nine personal computer workstations. Some of the students have gotten together to design and program a computer dating service for the student community.

At another school in the area, Interlake High School in Bellevue, students are not only writing their own software, they're building hardware as well, out of surplus components. They're working on a system in which one computer directs another by means of a walkie-talkie radio link, and the second computer controls a robot.

The teacher of these students, Tom Fackenthall, introduced his own son to the art of programming at the age of four, with questions like, "Can you make your name walk across the screen?" "Can you make your name flash?" "Can you make your name come in on one side and your mother's on the other?" His daughter, who is eleven, prefers to use the system for graphic design: greeting cards, gift wrapping, and art for art's sake.

The power is there in the machine, waiting to be used, and the challenge is almost irresistible. Of course, using it means learning the rituals that control its power; but, once you've been beguiled by a taste of it, the motivation—to have all that power under your command—is strong enough to overcome almost any obstacle.

Right, then: The Apple teaches very well all by itself (or with a game program or two), and in a well-thought-out community project it can teach even better. But how is it doing in the schools? Not very well, for two reasons: First, there just aren't enough machines available. Second, teachers haven't had a chance to learn all they need about the machines.

Computers at School. The Center for Social Organization of Schools at Johns Hopkins University publishes a newsletter called "School Uses of Microcomputers," a series of reports from a national survey of schools with microcomputers. The organization's June issue explores how much these systems are actually used and for what.

What's immediately obvious from reading the report is that there aren't enough computers available. Even at schools that have computers, only about one student in seven gets a chance to work with them; and that one doesn't get much time—typically around twenty minutes a week in elementary schools and about forty-five minutes in secondary schools.

In elementary schools, about 40 percent of students' computer time is spent on drill and practice programs in math, spelling, vocabulary, and the like. Another 20 percent goes into games, including learning games. There may be some confusion about terms here, since the report does not make clear which category an entertaining, game-style drill program would fall into. The remaining 40 percent of students' computer time is spent learning Basic, graphics, and other computer literacy skills.

In secondary schools, the picture is somewhat different. Only about a quarter of the computer time used by these students goes into drill and practice—and that includes the learn-

ing games as well. About half of students' time goes into computer literacy work, and the rest into more specialized uses, such as word processing, science lab assignments, business course work, and the like.

One of the interesting sidelights this report mentions is that relatively few teachers are familiar with microcomputers: In about half the schools with such systems, only one or two teachers use them regularly. This tends to limit the amount of use the system gets; some 10 percent of the schools use their computers for only an hour a day or less.

The Microcomputers in Education Institute. The answer is obvious: Teachers need better opportunities to develop their own computer literacy; only then can they lead others to it. A large step in the right direction is the Stanford Institute on Microcomputers in Education, which offered in June and July its intensive five-week course.

Mornings were devoted to intensive study and supervised lab work. After a week of tutored lessons in word processing, CAI evaluation, Basic, and applications programs, the attendees worked on individual or team projects involving software design, practice with languages and word processing, commercial software evaluation, and curriculum and proposal writing.

Early afternoons were devoted to equipment demonstrations, field trips to Bay Area computer sites, lectures by local specialists, and the like.

Best of all, the institute provided supervised computer work time for three hours each day, with more time available by appointment. Talk about access!

And, as if all that weren't good enough, this year there was also a scholarship fund specifically targeted to those who teach subjects other than math or science. Jeff Levinsky, codirector of the institute, points out that computers have many exciting uses in other areas of the school. "But once they start in the math department, it's hard to get them out. Therefore it's important for other teachers to learn about the new technology."

Science Resources. If you're a teacher trying to make the best use of your school's new micro system, computer literacy isn't all you need. You also need information about available software. Drill programs in simple arithmetic and English skills are easy to find, but where do you look for programs in simple physics and chemistry?

For chemistry, you might check with Project Seraphim. Sponsored by the National Science Foundation—Development in Science Education, this group has aims to develop modular instructional materials for chemistry; this is to help teachers learn the uses of microcomputers in chemical education and to encourage the development of utility programs that will make the writing of software easier.

Project Seraphim has compiled a list of available software in chemistry, listing about one hundred twenty programs from both commercial and noncommercial sources. The list gives a brief description of the program and its requirements: information on type of computer, subdiscipline of chemistry, specific hardware requirements, author's name, supplier, and cost. The list will be updated quarterly with new programs and modifications to existing programs.

The group also writes its own software. Its catalog includes a variety of information modules (information about sources, techniques, and so on), review modules (detailed user reviews of instructional programs), and software modules (for Apple, Pet, IBM pc, and TRS-80).

Project Seraphim also holds workshops and symposiums and serves as a clearing-house for information on the uses of microcomputers in the teaching of chemistry.

If you teach a science other than chemistry, you might want to get a look at the Cambridge Development Laboratory catalog. This group handles software from a variety of sources, covering mathematics and statistics, earth science, biology/ecology, chemistry, astronomy/space science, and physics. The catalog gives you essentially the same information about each entry as Seraphim's does—with the addition, in most cases, of a typical screen display from the program.

The catalog also offers various hardware devices, including instrumentation interfaces for various sensors, the sensors themselves (light, temperature, pH, angular motion, and voltage), serial and parallel interface cards, and other equipment.

And then there's Queue, which claims to be the oldest distributor of educational software in the world, having published its first catalog in January 1980. Queue now has three different catalogs in print and it also publishes a monthly magazine.

The magazine *Microcomputers in Education* contains news, several different types of software reviews, and announcements of new items added to the catalog.

Teachers' User Groups. When you start on a new adventure—such as trying to gain computer literacy—it's nice to have the company of colleagues as hesitant and wondering as yourself. A number of newsletters from various universities and associations are cropping up in which teachers can share their experiences. Many of them also have reviews and discussions of software, make announcements of workshops and training sessions, and offer simple technical advice.

Consider, for example, *On Wisconsin Computing*, from the Wisconsin Center for Education Research. The May issue starts off with an editorial in which the editor describes her visit to several software makers in the Silicon Valley. Then a speech and language clinician describes in detail the reactions of groups of three-year-olds, four-year-olds, and five-year-olds to the Xerox programs *Stickybear Numbers* and *Stickybear ABC*.

There are also various computer-related news items, a piece on using a microcomputer with preschool children, tips on floppy disk

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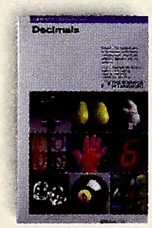

Introduction to Counting presents young children with the concepts of numbers, addition, subtraction, shape discrimination, weight, height, and measurement. *Apple, Atari disk $39.95. Atari tape $29.95.*

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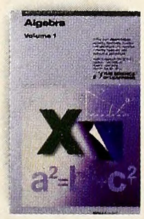
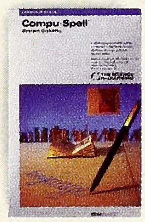
Compu-Math™ Decimals, a comparable *Atari* program is also available. *Atari disk $39.95. Atari tape $29.95.*

Advanced Mathematics



Algebra, volumes 1 through 6 is a series of independent programs comprising a first-year course in algebra. Concepts are presented in four distinct learning styles so that self-managed learning is encouraged. Volumes 1 through 4: *Apple, IBM PC $39.95 each.* Volumes 5 and 6 (sold as a set): *Apple, IBM PC $49.95.*

Language Skills



Spelling and Reading Primer™ uses simple words and pictures to introduce basic reading and spelling skills. Word groups cover simple two- and three-letter words through difficult multi-syllable words, double vowels and consonants, and directions and numbers. *Apple $39.95.*

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PSAT Word Attack Skills and **SAT Word Attack Skills** develop specific vocabulary skills in definition, connotation, roots and prefixes, and application. Test-taking skills required for the Scholastic Aptitude Tests are sharpened. *Apple $49.00 each.*

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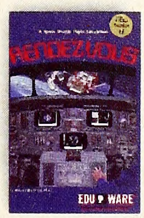

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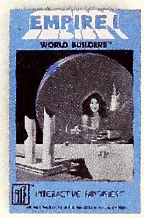

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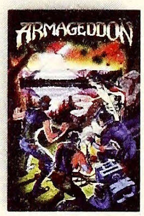

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handling and storage, and announcements of workshops and seminars.

Another useful publication is *Users*, the MECC Instructional Computing Newsletter (MECC is an acronym for Minnesota Educational Computing Consortium). This is shorter than the Wisconsin Center's and it has no editorial matter, but it does have several news items, announcements of instructional events, and a catalog of available courseware. There's also an announcement of a series of courseware in computer literacy.

Perhaps the most interesting item in the issue is the announcement of a contest. The grand prize is an Apple IIe, with disk drive and monitor, donated by Apple. It's a software-design contest, but you don't have to know programming in order to enter. You do have to be an educator, though.

The goal is to design a new piece of courseware for classroom use, but you don't have to write the program. The announcement says, "Entrants will submit the design of a courseware product as described in written narrative and screen layout sheets. The result will be potential products that could be programmed by others. This allows a wider variety of educators to enter, since programming skills are not required."

A contest-entry packet containing a full explanation of the rules (including information on the courseware development process and sample screen layout sheets) can be obtained from MECC.

Scholarly Evaluation. So how are we doing as a culture in terms of computer literacy? Not too well, yet. But that's not surprising, and it's probably only temporary. It's a high threshold we're aiming for—a whole new way of thinking is required—and not many of us have access to the necessary equipment.

But that's changing. The equipment pool is slowly growing, helped along by such things as Apple's offer to give a IIe system free to nearly every school in California (and nearly every school in the country, if Congress can work out the details); and, at the same time, we are learning how to help teachers over that threshold.

Just give us a couple of years. . . .

A.P.P.L.E., 21246 Sixty-eighth Avenue South, Kent, WA 98032; (206) 872-2245. Cambridge Development Laboratory, 100 Fifth Avenue, Waltham, MA 02154; (617) 890-8076. Center for Social Organization of Schools, The John Hopkins University, Baltimore, MD 21218. ComputerTown, Box E, Menlo Park, CA 94025; (415) 323-3111. Minnesota Educational Computing Consortium (MECC), 2520 Broadway Drive, Saint Paul, MN 55113; (612) 638-0626. Project Seraphim, Department of Chemistry, Eastern Michigan University, Ypsilanti, MI 48197; (313) 487-0368, 487-0106. Queue, 5 Chapel Hill Drive, Fairfield, CT 06432; (800) 232-2224. Reston Publishing Company, 11480 Sunset Hills Road, Reston, VA 22090; (800) 336-0338. Stanford University, Stanford, CA 94305; (415) 497-9788, 497-2102. Wisconsin Center for Education Research, School of Education, University of Wisconsin, Madison, 1025 West Johnson Street, Madison, WI 53706. Xerox Education Publications, 245 Long Hill Road, Middletown, CT 06457.

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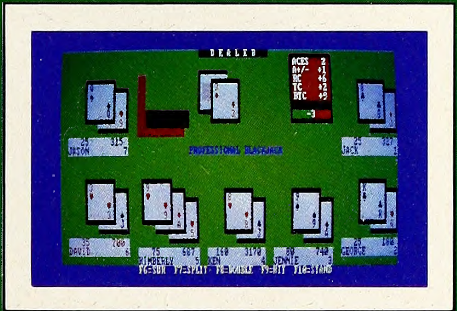

IBM PC* REQUIREMENTS: 48K RAM, disk drive, PC-DOS*, 80-character display. Color and monochrome versions supplied with each package.
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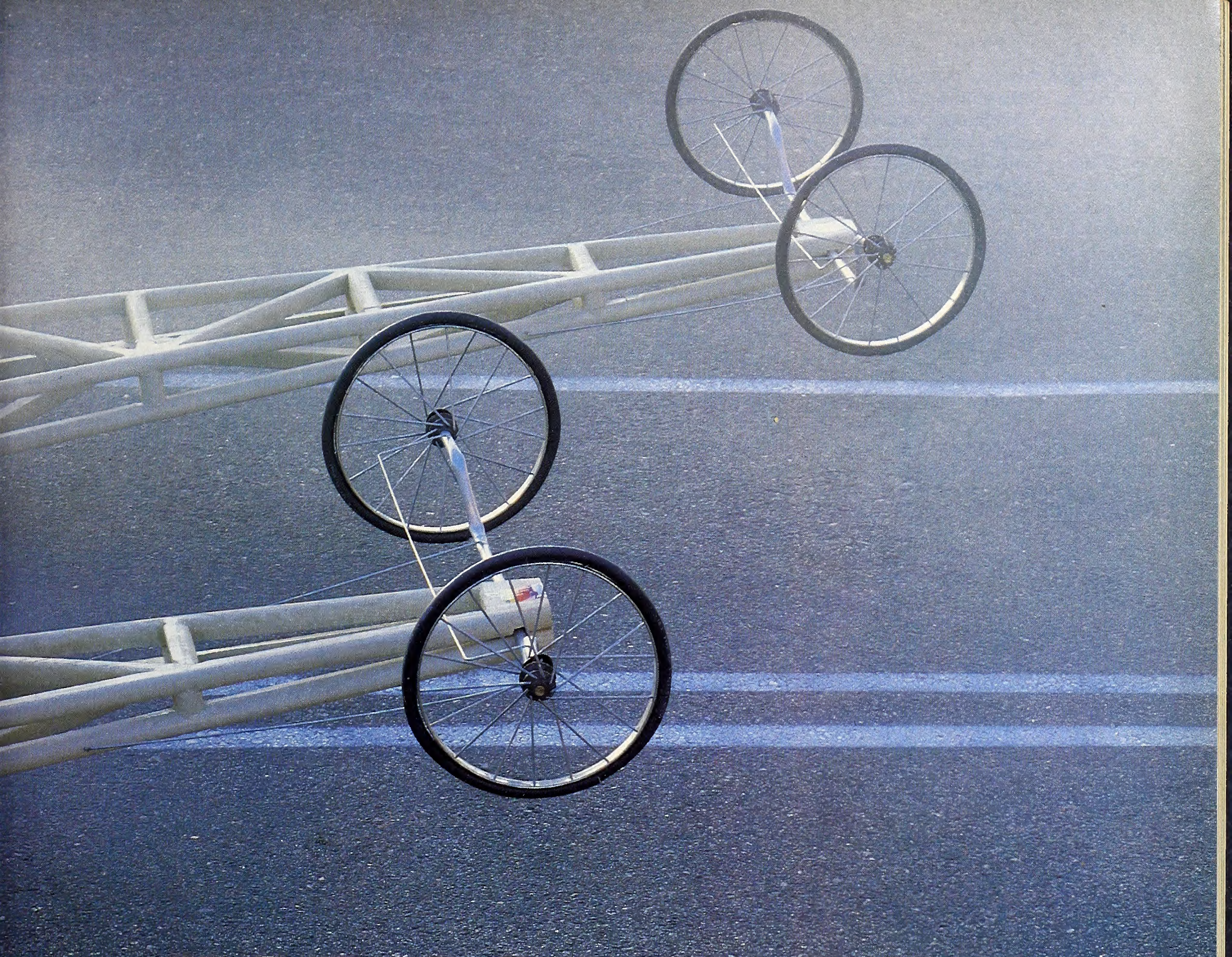
Few of the games written to use the Apple II game paddles will run on the Apple III in Emulation mode. The reason for this unfortunate situation is that the hardware in the Apple III requires very different software to read the paddles. Games that use the Monitor subroutine at $FBIE work on both machines, but many games contain their own routines that work only with the Apple II paddles. This article presents changes in the Emulation Monitor and a technique for altering games so they will work on the Apple III.

The previous article in this series described the organization of the Emulation disk and presented the *Trackmover* utility program to assist with alterations of the Emulation disk. The *Trackmover* or another disk zap utility will be needed to modify the Emulation program and some of the games.

The software solution to the game problem involves substantial modifications of the Apple II Monitor supplied on the Emulation disk. It also requires that you locate and change the routines in the games that read the paddles. This sounds formidable at first, but the tools in this article will allow you to convert a typical game in just a few minutes.

There is a catch, however. You must be able to modify the binary game file on the disk, which means that you can fix only those games that are available as DOS files. Some copy-protected games can be modified. The game file of many recent games is a normal DOS 3.2 or 3.3 file, even though the disk is copy-protected. The game file can be copied to another disk and modified as described here. You can often then run the game if you bload the modified game file, insert the original master disk in the drive, and then start the game with a call to the first address in the game file. It helps if the copy of the game file occupies the same tracks and sectors on the disk as the original, so the disk head is in the same position after the game is loaded from either disk.

In many, perhaps most, cases where the game file is a normal DOS



HOT ROD III

Start Your Engines!

by George Oetzel

file, the protection scheme won't balk if you modify the original disk using a track/sector editor. Of course, attempting to modify an original master that is so well protected that you can't make a backup is a fairly high-stakes computer game. Don't try it unless you are willing to accept some losses.

Here's an outline of the process we'll use to make games run on the Emulation Apple:

1. Revise the Monitor program so that the paddle initialization is done in subroutines.

2. Replace paddle initialization instructions (LDA $C070) in the game with calls to the appropriate subroutine.

3. Replace paddle test instructions, usually LDA $C064 or LDA $C065, with LDA $C066.

In many games only four bytes need to be changed.

Paddle Reading and Monitor Modifications. Let's look at the subroutines that read the paddles. Listing 1 is the paddle-reading subroutine from the Apple II Monitor. Listing 2 is the paddle-reading routine furnished on the Emulation disk. The substantially longer Apple III routine is broken into two pieces to preserve parts of the Monitor that other programs will likely use. There is space for this long routine because the omission of cassette tape routines leaves about one hundred unused bytes in the Monitor. These free bytes allow numerous interesting modifications of the Emulation Apple.

To a calling program, the two subroutines are functionally identical. The paddle number is in the X register when the subroutine is called. The paddle value is in the Y register, with the X register unchanged, on return from the subroutine.

The first, and largest, part of the Apple III routine is devoted to paddle selection. Commands must be given to select one of eight inputs to the analog-to-digital converter (A/D). The selection requires reference to

one member of each of three pairs of memory addresses. Figure 1 summarizes the selection rules.

After the paddle has been selected, the operating principle of the Apple III routine is the same as that of the Apple II routine. Why is it so much more complicated? Apple decided that the reference voltage required to yield a paddle output of 255 (or $FF) should be 2.4 volts. That decision is based on joysticks that use 20 percent of the total potentiometer rotation for full joystick deflection. If the joystick is connected to 12 volts, 20 percent of the range yields a maximum output of 2.4 volts. If

```
0000:                ;
0000:                ;
----- NEXT OBJECT FILE NAME IS AP2PADDLE.OBJ0
FB1E:                          ORG   $FB1E
FB1E:AD 70  C0     PREAD       LDA   $C070
FB21:A0 00                     LDY   #$00
FB23:EA                        NOP
FB24:EA                        NOP
FB25:BD 64  C0     PREAD2      LDA   $C064,X
FB28:10 04                     BPL   RTS2D
FB2A:C8                        INY
FB2B:D0 F8                     BNE   PREAD2
FB2D:88                        DEY
FB2E:60            RTS2D       RTS
```

Listing 1. Paddle-reading subroutine from the Apple II Monitor.

```
0000:                ;
0000:                ;
0000:                ;
FCC9:              PART2       EQU   $FCC9
0000:                ;
----- NEXT OBJECT FILE NAME IS AP3PADDLE.OBJ0
FB1E:                          ORG   $FB1E
FB1E:8A                        TXA
FB1F:48                        PHA
FB20:49 01                     EOR   #$01
FB22:AA                        TAX
FB23:AD 59  C0                 LDA   $C059
FB26:AD 5E  C0                 LDA   $C05E
FB29:AD 5A  C0                 LDA   $C05A
FB2C:4C C9  FC                 JMP   PART2
----- NEXT OBJECT FILE NAME IS AP3PADDLE.OBJ1
FCC9:                          ORG   $FCC9
FCC9:E8                        INX
FCCA:CA                        DEX
FCCB:F0 12                     BEQ   PDLSET
FCCD:AD 5F  C0                 LDA   $C05F
FCD0:CA                        DEX
FCD1:F0 0C                     BEQ   PDLSET
FCD3:AD 58  C0                 LDA   $C058
FCD6:CA                        DEX
FCD7:F0 06                     BEQ   PDLSET
FCD9:AD 5E  C0                 LDA   $C05E
FCDC:AD 5B  C0                 LDA   $C05B
FCDF:AD 5C  C0     PDLSET      LDA   $C05C
FCE2:A9 0F                     LDA   #$0F
FCE4:20 A8  FC                 JSR   $FCA8
FCE7:A4 80                     LDY   $80
FCE9:AD 5D  C0                 LDA   $C05D
FCEC:A2 48         INIT        LDX   #$48
FCEE:CA                        DEX
FCEF:10 FB                     BPL   INIT
FCF1:E8            PREAD2      INX
FCF2:B9 E6  BF                 LDA   $BFE6,Y
FCF5:2A                        ROL   A
FCF6:AD 66  C0                 LDA   $C066
FCF9:30 F6                     BMI   PREAD2
FCFB:8A                        TXA
FCFC:10 04                     BPL   MULT2
FCFE:A9 FF                     LDA   #$FF
FD00:D0 01                     BNE   OUTPUT
FD02:2A            MULT2       ROL   A
FD03:A8            OUTPUT      TAY
FD04:68                        PLA
FD05:AA                        TAX
FD06:60                        RTS
```

Listing 2. Paddle-reading subroutine from the Emulation Monitor.

the Apple II counting routine is used, it requires about 2.55 volts' input to reach the full output value. The loop used in the Apple III remedies this problem by effectively counting only half-range and then doubling the output.

It is easy to fix a paddle or joystick so that its full range is about 2.6 volts, and it will work with the standard counting software. You can build a very nice paddle from scratch for about ten dollars. Directions for modifying the Cursor III joystick are given with figure 2.

Achieving simplicity in game alterations requires the rebuilding of the paddle software in the Monitor. *DOS Tool Kit* assembly listings of the four Monitor patches are given in listings 3 through 6 at the end of this article. Assemble the four routines and use the *Trackmover* program to install them as described in the following paragraphs.

Start with a copy of an Emulation disk that already has the modified reset vector described last month. Otherwise, make that modification along with those described in this article. Load track 5 into memory at address $5000, then exit to Basic and load the patch routines as follows:

```
BLOAD MONFIX1.OBJ0,A$561E
BLOAD MONFIX2.OBJ0,A$57C9
BLOAD MONFIX3.OBJ0,A$59CE
BLOAD MONFIX4.OBJ0,A$59FE
```

Input selected	C058=0 C059=1	C05A=0 C05B=1	C05E=0 C05F=1
Ground reference	0	0	0
Apple II paddle 3	0	0	1
Apple II paddle 2	0	1	0
Not used	0	1	1
Apple II paddle 1	1	0	0
Apple II paddle 0	1	0	1
Clock battery	1	1	0
2.4 volt reference	1	1	1

Figure 1. Apple III paddle selection requires memory reference commands to one member of each of three pairs of addresses. The figure shows which input is selected for each of the eight possible combinations.

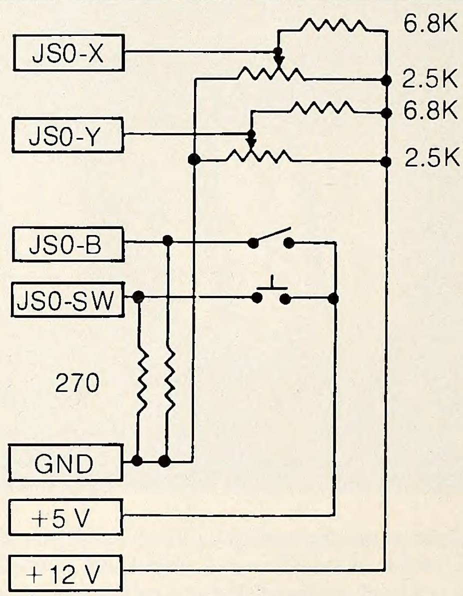


Figure 2. Modifying the Cursor III joystick for Apple II Emulation. The circuit of the Cursor III joystick is identical to that shown on page 130 of the *Owner's Guide*, using 2.5K potentiometers. Adding two 6.8K, 0.25 W resistors as shown will increase the maximum output voltage to about 2.6V for use with software that mimics the Apple II routines.

The Apple II uses a left-handed X-Y coordinate system for its screen display convention; the Apple III is right-handed. As a result no orientation of Cursor III is right for Apple II joystick applications. To fix this, interchange the connections at the two ends of one of the potentiometers. You will then have to recenter the joystick control. Loosen the set screw and take the joystick assembly off of the potentiometer shaft. Rotate the shaft until a simple Applesoft program indicates that the paddle value is about 128. Then reassemble the joystick. Getting the control centered properly with everything assembled and the set screw tight takes some patience.

It will be easier to modify track 9 if you save the entire modified portion of the Monitor as a single file:

```
BSAVE MONMOD,A$5600,L$500
```

Use the *Trackmover* to restore the $5000 address block to track 5 on the disk and then load track 9 into the $5000 block. Now bload Monmod,A$5100 and restore track 9 to the modified Emulation disk.

The Monitor modifications separate paddle selection and the A/D conversion timing so that the paddle selection is performed by subroutines. The assembly instructions to call these subroutines are:

paddle 0 select	20	D0	FE	JSR	$FED0
paddle 1 select	20	D7	FE	JSR	$FED7
paddle 2 select	20	17	FF	JSR	$FF17
paddle 3 select	20	0A	FF	JSR	$FF0A

There are two multipaddle subroutines. The standard paddle-reading routine at $FB1E accepts a paddle number in the X register and returns the resulting value in the Y register. This subroutine is used by Basic and many games. A comparable, alternative subroutine at $FEFE samples paddle 2 when paddle 1 is requested and vice versa. This allows use of a joystick that is plugged into port A (paddles 0 and 2) without modifying anything except the address of the subroutine call and the paddle 1 firing-button check.

Game Modification. The typical arcade game has a built-in paddle routine that is nearly identical to the one in the Apple II Monitor. Sometimes, though, there are changes designed to limit the numerical range of the output values. Here is an example taken from a game with a nonstandard routine to read paddle 0. The example also shows the changes you must make to fix the game so that it will read the Apple III paddles, using the modified Monitor. The memory contents are shown for the two modified instructions.

Address	Original version					Modified version				
1800–	AD	70	C0	LDA	$C070	20	D0	FE	JSR	$FED0
1802–	A0	24		LDY	#$24				LDY	#$24
1804–	EA			NOP					NOP	
1805–	EA			NOP					NOP	
1806–	AD	64	C0	LDA	$C064	AD	66	C0	LDA	$C066
1809–	10	05		BPL	$1810				BPL	$1810
180B–	C8			INY					INY	
180C–	C0	9E		CPY	#$9E				CPY	#$9E
180E–	90	F6		BCC	$1806				BCC	$1806
1810–	C4	10		CPY	$10				CPY	$10
1812–	D0	01		BNE	$1815				BNE	$1815
1814–	60			RTS					RTS	

Game conversion to run with the revised Monitor requires locating the paddle routines in the game, a little disassembly to be sure that the paddle reading isn't too convoluted, and modification of just a few bytes, as illustrated above. In many cases, the whole procedure can be completed in five minutes or so. There are a few hopeless cases in which a single LDA $C070 instruction initiates an interlaced set of instructions to read two or more paddles.

To fix a game so that it will run on the Apple III, you will have to locate the paddle-reading routines, make changes as previously shown, and save the modified game on the disk. The DOS bsave command balks at files larger than 32,767 bytes (129 sectors on the disk). If the game file is smaller, just bload Game,A$1000 from the Monitor. Then check the length of the file. The low-order byte of the length is in $AA60 after the load; the high-order byte is in $AA61. You will need this information to save the file after you have fixed it.

After the file is in memory, you have to find all the instances of LDA $C070 or BIT $CO70 instructions to find all the places where the game needs to be changed. There are utility programs (such as *The Inspector*, by Omega Microware) that have built-in memory and disk-search features.

If you don't have one of these, the program given in listing 7 will do the job for you. It loads into the page-three area that is universally used for small assembly language routines. After it is loaded, type *300G* from the Monitor to link it to the Monitor control-Y instruction. Memory address $00 contains the number of bytes in the pattern to be located, and the pattern is loaded into memory beginning at $01. Limit patterns to nine bytes or less to avoid destroying important zero-page locations. On a practical basis, a three-byte pattern almost always yields just a few locations. To find all of the LDA $C070 instructions in the memory range from $1000 to $90FF, enter this from within the Monitor.

```
0:3 AD 70 C0
1000.9000 control-Y
```

The address of the $AD byte for each paddle routine in the address range will be printed on-screen after you type return. Disassemble the paddle routine in each location to be sure what is going on. An LDA $C064 instruction, as shown in the example just given, indicates paddle 0. Similarly, LDA $C065 indicates paddle 1. Replace the LDA $C070 instruction with a JSR instruction to initialize the appropriate paddle. Also, replace LDA $C06*x* with LDA $C066.

If you have a joystick with connections only to a single joystick port, then you will want to use paddle 0 and paddle 2 where the normal Apple II organization uses paddles 0 and 1. If the two paddle routines are independent, then use JSR $FF17 in place of the LDA $C070 that starts the paddle 1 read in the game. You will also have to change the firing-button commands to use buttons 0 and 2. Button 1 is read by LDA $C062; change it to LDA $C063 for the paddle 2 button.

Many games using joysticks employ the Monitor routine at $FB1E to read them. These games run without modification if you can connect your joystick to the normal paddle 0 and 1 combination. The Monitor patches include an option that interchanges the logical paddle 1 and paddle 2 assignments. Change JSR $FB1E in the game to JSR $FEFE to perform the swap. The normal subroutine, at $FB1E, could be changed to the swapped configuration quite easily, but this isn't a universal solution. Game conversion often would still require changing the firing-button commands.

Because of the file-length limitation with the DOS bsave command, extremely long game files must be searched in pieces to find all of the paddle routines. The *Trackmover* program presented in part 1 of this series can be used to assist in this search. Initialize a DOS disk with a minimum hello file and then transfer the game program to it, using Apple's FID or another disk utility. DOS stores programs on a newly initialized disk in consecutive tracks and sectors. You can expect to find the hello program on track $12 and the first track/sector list for your game on track $13, sector $F. The track allocation continues with tracks $3 through $A. In spite of the fact that DOS is quite consistent, it's a good idea to find and check the track/sector lists to determine exactly what part of the disk contains your program. The catalog entry, with a pointer to the track/sector list, is on track $11, sector $F, if the game is the second program recorded after initializing the disk. Both the DOS 3.3 manual and *Beneath Apple DOS*, by Don Worth and Pieter Lechner, provide guides to the interpretation of catalog entries and track/sector lists.

Use the *Trackmover* program to load seven program tracks into the memory range $1000–$7FFF. Each track will be loaded in its proper memory order if you change two program lines in *Trackmover*.

```
2140 S(1) = 15
2160 S(16) = 0
```

Use the pattern-location program to find the paddle-control routines. Modify the paddle control with the Monitor or the Miniassembler, and then use the *Trackmover* to save the modified portions back to the same place on the disk. Continue with the remaining tracks that contain portions of the game program until you are sure that you have located and modified all of the paddle-control routines. Few games have more than two paddle control routines.

Next month, we'll go into the workings of the Emulation program itself, including the instructions that set up the Emulation mode. Study of the details of the Emulation program makes possible useful modifications, such as the reading and display of lower-case characters. It also makes possible more exotic Emulation Apples, if the machine-control register setup is different from that furnished on the Emulation disk. Meanwhile, try modifying some games to work on the Apple III. You'll find that the conversion is an enjoyable and rewarding challenge.

Listing 3. Emulation Monitor patch 1 for use with Apple II games.

```
0000:               ;
0000:               ;
0000:               ; **************************************
0000:               ;
0000:               ;       APPLE III EMULATION MODE
0000:               ;       PADDLE-SERVICE ROUTINES
0000:               ;
0000:               ;       MONITOR PATCH ROUTINE #1
0000:               ;       NORMAL PADDLE ENTRY
0000:               ;
0000:               ;       PADDLE NUMBER IN X
0000:               ;       VALUE READ RETURNS IN Y
0000:               ;
0000:               ;
0000:               ;
0000:               ; **************************************
0000:               ;
FCC9:                 NORMSET    EOU    $FCC9
0000:               ;
----- NEXT OBJECT FILE NAME IS MONFIX1.OBJ0
FB1E:                            ORG    $FB1E
FB1E:20  C9  FC                  JSR    NORMSET
FB21:A0  00                      LDY    #$00
FB23:EA                          NOP
FB24:EA                          NOP
FB25:AD  66  C0       PREAD2     LDA    $C066
FB28:10  04                      BPL    RTS2D
FB2A:C8                          INY
FB2B:D0  F8                      BNE    PREAD2
FB2D:88                          DEY
FB2E:60               RTS2D      RTS
```

Listing 4. Emulation Monitor patch 2.

```
0000:               ; **************************************
0000:               ;
0000:               ;     APPLE III EMULATION MODE
0000:               ;     PADDLE-SERVICE ROUTINES
0000:               ;
0000:               ;     MONITOR PATCH ROUTINE #2
0000:               ;     NORMAL PADDLE SETUP SEOUENCE
0000:               ;
0000:               ;
0000:               ;
0000:               ; **************************************
0000:               ;
FECE:                 PDL0X      EOU    $FECE
FED5:                 PDL1X      EOU    $FED5
FF15:                 PDL2X      EOU    $FF15
FF08:                 PDL3X      EOU    $FF08
0000:               ;
----- NEXT OBJECT FILE NAME IS MONFIX2.OBJ0
FCC9:                            ORG    $FCC9
FCC9:8A               NORMSET    TXA
FCCA:48                          PHA
FCCB:F0  0F                      BEO    JMP0X
FCCD:CA                          DEX
FCCE:F0  09                      BEQ    JMP1X
FCD0:CA                          DEX
FCD1:F0  03                      BEO    JMP2X
FCD3:4C  08  FF                  JMP    PDL3X
FCD6:4C  15  FF       JMP2X      JMP    PDL2X
FCD9:4C  D5  FE       JMP1X      JMP    PDL1X
FCDC:4C  CE  FE       JMP0X      JMP    PDL0X
```

Listing 5. Emulation Monitor patch 3.

```
0000:               ;
0000:               ; **************************************
0000:               ;
0000:               ;       APPLE III EMULATION MODE
0000:               ;       PADDLE-SERVICE ROUTINES
0000:               ;
0000:               ;       MONITOR PATCH ROUTINE #3
0000:               ;       PADDLE 0 & 1 INITIALIZATION
0000:               ;
0000:               ;
0000:               ;
0000:               ; **************************************
0000:               ;
FCA8:                 WAIT       EOU    $FCA8
0000:               ;
----- NEXT OBJECT FILE NAME IS MONFIX3.OBJ0
FECE:                            ORG    $FECE
FECE:68               PDL0X      PLA
FECF:AA                          TAX
FED0:AD  5F  C0       PDL0       LDA    $C05F
FED3:D0  05                      BNE    PX
FED5:68               PDL1X      PLA
FED6:AA                          TAX
FED7:AD  5E  C0       PDL1       LDA    $C05E
FEDA:AD  59  C0       PX         LDA    $C059
FEDD:AD  5A  C0                  LDA    $C05A
FEE0:               ;
FEE0:               ;       PADDLE SELECT IS COMPLETE AT
                            THIS POINT
FEE0:               ;       FOLLOWING STATEMENTS INITIATE
                            THE A/D
FEE0:               ;       NOTE THAT X AND Y ARE
                            UNCHANGED
FEE0:               ;       FROM HERE THRU THE RTS
FEE0:               ;
FEE0:AD  5C  C0       GO         LDA    $C05C
FEE3:A9  0F                      LDA    #$0F
FEE5:20  A8  FC                  JSR    WAIT
FEE8:AD  5D  C0                  LDA    $C05D
FEEB:38                          SEC
FEEC:A9  0E                      LDA    #$0E
FEEE:E9  01           WAIT4      SBC    #$01
FEF0:D0  FC                      BNE    WAIT4
FEF2:60                          RTS
```

Listing 6. Emulation Monitor patch 4.

```
0000:               ;
0000:               ; **************************************
0000:               ;
0000:               ;     APPLE III EMULATION MODE
0000:               ;     PADDLE-SERVICE ROUTINES
0000:               ;
0000:               ;     MONITOR PATCH ROUTINE #4
0000:               ;     PADDLE INITIALIZATION FOR
0000:               ;     SWAPPED PADDLE 1 AND 2
0000:               ;
0000:               ;
0000:               ;
0000:               ; **************************************
0000:               ;
FECE:                 PDL0X      EQU    $FECE
FED5:                 PDL1X      EOU    $FED5
FEE0:                 GO         EQU    $FEE0
FB25:                 PREAD2     EQU    $FB25
FEFE:                 SWAPSET    EOU    $FEFE
0000:               ;
----- NEXT OBJECT FILE NAME IS MONFIX4.OBJ0
FEFE:                            ORG    $FEFE
FEFE:8A               SWAPPED    TXA
FEFF:48                          PHA
FF00:F0  CC                      BEO    PDL0X
FF02:CA                          DEX
FF03:F0  10                      BEO    PDL2X
FF05:CA                          DEX
FF06:F0  CD                      BEO    PDL1X
FF08:68               PDL3X      PLA
FF09:AA                          TAX
FF0A:AD  58  C0       PDL3       LDA    $C058
FF0D:AD  5A  C0                  LDA    $C05A
FF10:AD  5F  C0                  LDA    $C05F
FF13:D0  CB                      BNE    GO
FF15:68               PDL2X      PLA
FF16:AA                          TAX
FF17:AD  58  C0       PDL2       LDA    $C058
FF1A:AD  5B  C0                  LDA    $C05B
FF1D:AD  5E  C0                  LDA    $C05E
FF20:D0  BE                      BNE    GO
FF22:20  FE  FE       SPREAD     JSR    SWAPSET
FF25:4C  25  FB                  JMP    PREAD2
FF28:00                          BRK
```

Listing 7. Program to locate byte patterns in Apple II memory.

```
0000:              ; ****************************************
0000:              ;
0000:              ;       BYTE PATTERN LOCATOR
0000:              ;  ENTER NUMBER OF BYTES IN PATTERN
0000:              ;  INTO LOCATION $00. ENTER PATTERN
0000:              ;  BEGINNING IN LOCATION $01.
0000:              ;
0000:              ;  INITIALIZE MONITOR HOOK BY 300G.
0000:              ;  SEARCH ADDRESS RANGE USING
                      XXXX.YYYY CTRL-Y RETURN
0000:              ;  PATTERN START ADDRESSES WILL BE
                      PRINTED ON-SCREEN
0000:              ;
0000:              ;
0000:              ;
0000:              ;
0000:              ; ****************************************
0000:              ;
0000:              NUMBYT    EQU   $00
0001:              PATTERN   EQU   $01
003C:              A1        EQU   $3C
003D:              A1H       EQU   $3D
003E:              A2        EQU   $3E
003F:              A2H       EQU   $3F
0040:              A3        EQU   $40
0041:              A3H       EQU   $41
03F8:              VECTOR    EQU   $3F8
FDDA:              PRHEX     EQU   $FDDA
FDED:              COUT      EQU   $FDED
0000:              ;
----- NEXT OBJECT FILE NAME IS PATTERN.300.OBJ0
0300:                        ORG   $300
0300:              ;
0300:              ;  PUT JUMP INSTRUCTION TO PROGRAM
0300:              ;  START INTO $3F8 FOR CTRL-Y ENTRY
0300:              ;
0300:A9 4C                   LDA   #$4C
0302:8D F8 03                STA   VECTOR
0305:A9 10                   LDA   #>START
0307:8D F9 03                STA   VECTOR+1
030A:A9 03                   LDA   #<START
030C:8D FA 03                STA   VECTOR+2
030F:60                      RTS
0310:              ;
0310:              ; START PATTERN FINDER
0310:              ;
0310:A9 00         START     LDA   #$00
0312:A4 3C                   LDY   A1
0314:85 3C                   STA   A1
0316:20 32 03                JSR   SRCHP1
0319:18                      CLC
031A:90 03                   BCC   INCX
031C:              ;
031C:              ;  MAIN LOOP TO SEARCH MEMORY
031C:              ;
031C:20 30 03      LOOP      JSR   SRCHPG
031F:E6 3D         INCX      INC   A1H
0321:A5 3D                   LDA   A1H
0323:F0 0A                   BEQ   RTS1
0325:C9 C0                   CMP   #$C0
0327:F0 F6                   BEQ   INCX
0329:C5 3F                   CMP   A2H
032B:90 EF                   BCC   LOOP
032D:F0 ED                   BEQ   LOOP
032F:60            RTS1      RTS
0330:              ;
0330:              ;  SUBROUTINE TO SEARCH ONE
                      MEMORY PAGE
0330:              ;  FOR DESIRED PATTERN
0330:              ;
0330:A0 00         SRCHPG    LDY   #$00
0332:A5 01         SRCHP1    LDA   PATTERN
0334:D1 3C         SRCLOOP   CMP   (A1),Y
0336:F0 04                   BEQ   EQUAL
0338:C8                      INY
0339:D0 F9                   BNE   SRCLOOP
033B:60                      RTS
033C:84 40         EQUAL     STY   A3
033E:A5 3D                   LDA   A1H
0340:85 41                   STA   A3H
0342:A2 01                   LDX   #$01
0344:E8            NEXTBYT   INX
0345:8A                      TXA
0346:C5 00                   CMP   NUMBYT
0348:F0 02                   BEQ   TEST
034A:B0 11                   BCS   PRADR
034C:B5 00         TEST      LDA   NUMBYT,X
034E:C8                      INY
034F:F0 06                   BEQ   NEXTPG
0351:D1 3C         COMPARE   CMP   (A1),Y
0353:F0 EF                   BEQ   NEXTBYT
0355:D0 DB                   BNE   SRCHP1
0357:E6 3D         NEXTPG    INC   A1H
0359:D0 F6                   BNE   COMPARE
035B:F0 21                   BEQ   ENDER
035D:A5 41         PRADR     LDA   A3H
035F:20 DA FD                JSR   PRHEX
0362:A5 40                   LDA   A3
0364:20 DA FD                JSR   PRHEX
0367:A9 A0                   LDA   #$A0
0369:20 ED FD                JSR   COUT
036C:18                      CLC
036D:A5 40                   LDA   A3
036F:65 00                   ADC   NUMBYT
0371:A8                      TAY
0372:90 BE                   BCC   SRCHP1
0374:E6 41                   INC   A3H
0376:F0 06                   BEQ   ENDER
0378:A5 41                   LDA   A3H
037A:85 3D                   STA   A1H
037C:D0 B4                   BNE   SRCHP1
037E:68            ENDER     PLA
037F:68                      PLA
0380:60                      RTS
```

BACKTALK

BY TOMMY GEAR

August Rodin's portrayal of man as The Thinker presents us with a most striking image of our condition. Solitary, rapt in thought, the figure is in active concentration, with every muscle held taut. What exactly is he thinking about? Perhaps he's trying to figure out how to afford to send his kids to college; or maybe he's trying to decide whether El Salvador is becoming another Vietnam; or could he be contemplating a solution to that sticky programming problem that's been keeping him up nights?

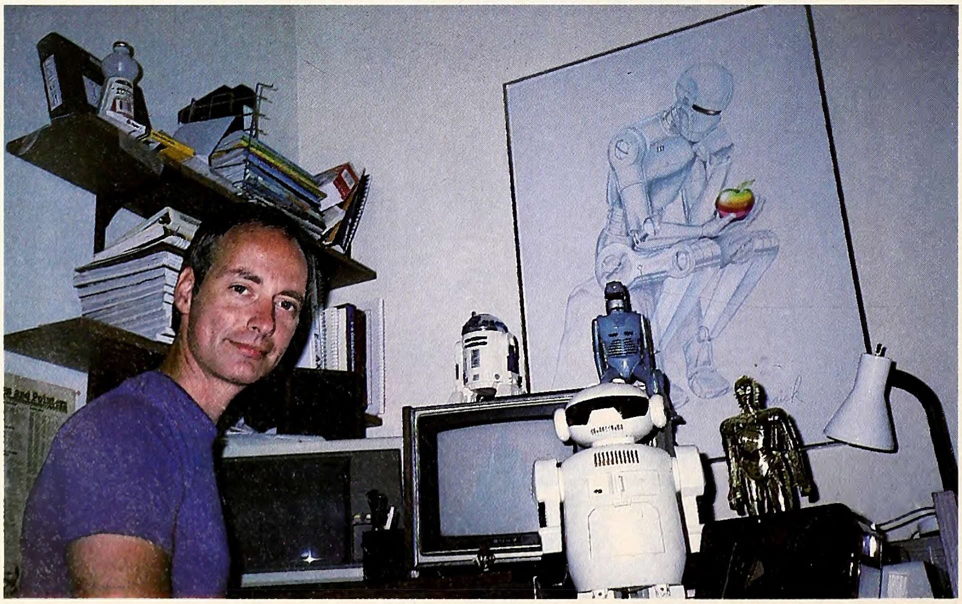
It's the hallmark of all great art to spark such imaginings, allowing us to find a bit of ourselves in the artist's conception. But what if a machine, say a robot, possessing a highly developed form of artificial intelligence, could produce a representation of itself in a work of art?

That's one thought that may have struck *Softalk* readers back in 1981 when they saw the August issue. The cover was an airbrush rendering of a metallic-skinned robot in the same position as Rodin's thinking man. The figure sat gazing at a familiar-looking rainbow-colored apple in its hand, presumably contemplating a byte. The image set the tone for *Softalk*'s first feature on robotics.

Artist Robert Zraick had always been fascinated with robots. In 1981, he had just purchased an Apple when he happened upon the *Softalk* office. A new subscriber, he recognized the name on the door and introduced himself. This meeting led to the commission of the cover. The idea for the picture came to him in a flash one day, he says, as he stood on the sidewalk right outside *Softalk*'s front door.

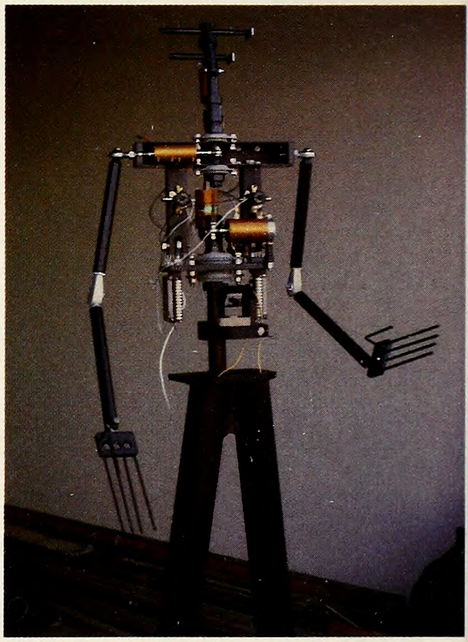
This kind of spontaneous inspiration came as no surprise to Zraick. It's something he'd come to rely on, and it's often helped to carry him through the various pursuits he's explored in developing a unique career, a fascinating collage of his talents.

Contemplating an Artist's Career. Schooled as a commercial artist, Zraick made a good living for himself designing logos, promotional campaigns for books, and the like. Zraick admits feeling at first the way many artists do about computers—he hated them, or rather he misunderstood them. To him, computers were just glorified calculators, and whoever heard of using a calculator as an artistic tool? Such machines are only of value to accountants and the like. So he thought until the time he encountered an Apple.



Framed above Robert Zraick's Apple is the original art he created for the cover of *Softalk*'s August 1981 issue. An avid robot enthusiast and *RobotWar* game player, Zraick is joined by a few friends.

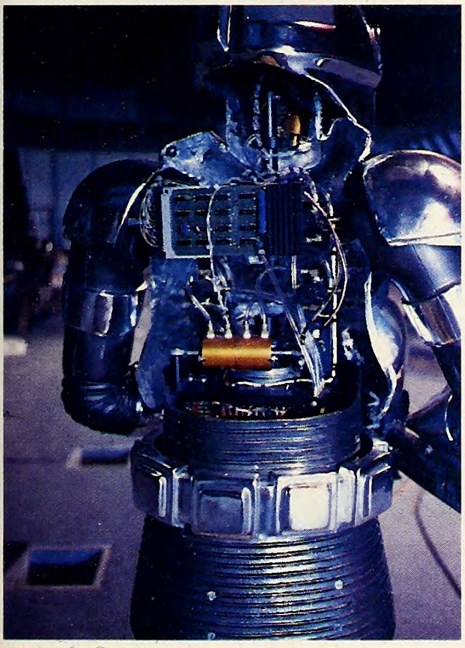
Possessed with a flair for the theater, Zraick was seduced by the smell of grease paint and the feel of sawdust underfoot. In the early 1970s he matriculated in that hallowed institution known as Clown College. Upon graduation he joined the Ringling Bros. & Barnum and Bailey Circus, and for two seasons clowned around the country professionally. Along the way, Zraick refined his skills in another of the entertainment arts—magic—and also learned to create

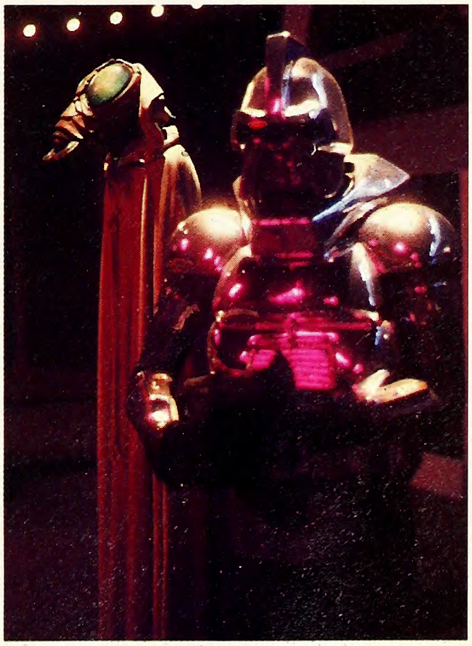


fantastic masks and movable forms from sculpted plastic. This experience paid off when he said farewell to the big top and found himself seeking work in Hollywood.

There, in the employ of Universal Studios, Zraick's fascination with robots blossomed when he was made project director for the studio tour's *Battlestar Galactica* attraction in 1979. It was his responsibility to supervise the entire production, which combines live action, music, audioanimatronic robots and monsters, lasers, and other special effects in an action-packed scenario. The finished show repeats every few minutes for the steady stream of tourists visiting the studio lot. The whole spectacle is controlled by a set of EPROMs that were programmed on none other than an Apple. From

The artist exhibits an intimate knowledge of Yorick, under the luminous gaze of another, less savory character. Both figures were sculpted in plastic by Zraick and painted. The hideous bust is that of the Imperious Leader from the Universal Studios Tour's *Battlestar Galactica* attraction.





Opposite page and above, from left to right: Four views, from bare-bones machinery to full raiment, of two robotic protagonists that have been programmed, by the usually benign Apple, to visually and aurally assault visitors touring Universal Studios.

this initial encounter, any prejudice he'd had against computers evaporated as Zraick's quick mind drew the analogy between the way of art and the way of computers.

"The potential of computers is just like that of art; it goes as far as a human being's potential. The only limitations," he now believes, "are those set by the operator himself."

Having made this essential connection, it wasn't long before Zraick purchased his own Apple and found himself airbrushing that cover illustration of the musing robot. Today, with the formation of his own company, Zraphic Arts, Zraick offers his services as a free-lance designer and special-effects consultant to clients that include a satellite-communications company, the McDonald's hamburger chain, and 7-Eleven food stores.

Zraick is also in the process of writing custom software on his Apple. In conjunction with a nonprofit corporation called ACTS and friend Randi Erins, he is exploring the development of a software-based alternative cancer therapy system. In the past he has used the Alf music boards, Echo speech synthesizer, and the KoalaPad Touch Tablet to create entertaining musical animations for his own pleasure. Now he wants to write programs that will bring pleasure to others and encourage their natural self-healing potentials.

Most recently, Zraick contributed his talents as monster-mask maker to the soon-to-be-released movie version of Kurt Vonnegut's best-selling book *Slapstick*.

As a man full of plans, Robert Zraick has learned to plot his strategies well. He'd be the first to claim that his expertise in planning, as well as programming, is due at least in part to the time he has spent playing his favorite game, *RobotWar*. The engrossing strategy of the game of battling robots appealed to Zraick's inquiring mind as much as its robot theme did.

Silas Warner, Muse Software cofounder and programmer of the strategy-learning game *RobotWar*, believes that the best strategy for his company lies in the diversification of its software products to run on a variety of microcomputers. Right: *RobotWar* tournament organizer Frank Krogh publishes a newsletter detailing the robot bouts that occur regularly and invites all players seeking a challenge to join in the fun.

A Game and Its Muse. The uniqueness of Muse Software's *Robot War* lies in the fact that, in planning your robot's battle strategy, you become adept with programming concepts and logical thinking. It was this game concept, still ahead of its time, that precipitated *Softalk*'s spotlighting Muse in an Exec feature in February 1982. Both *Robot War* and another of the company's game offerings, *Castle Wolfenstein,* had been in dominant positions on the best-seller list throughout the second half of 1981. Muse's word processor, *Super-Text*, continues to flirt with the elite.

Since that time, the company has released *Caverns of Freitag*, another game, and has updated all its Apple offerings to be IIe-compatible. Muse's current efforts, says cofounder and programmer Silas Warner, reflect the importance he attributes to the development of a viable sales policy emphasizing mass merchandising. Warner believes that the specialized computer store will come to play a less prominent role as a marketing outlet in the future and that more and more people will come to buy their micros through department store chains and the like. As a result, Muse has been diversifying over the last year and a half, developing versions of its previously released programs to run on the IBM pc, Commodore, and Atari computers.

But the Apple market hasn't been forgotten. Two new offerings from Muse are expected late this summer. One, a strategy game called *Titan Empire*, was written by Muse founder and *Super-Text* author Ed Zaron. The game pits the player against eight enemy ships in a battle for control of the solar system—with a twist: Players must take into account the orbits of the planets being defended. The other new package, *Eating Machine*, developed by nutritionist/programmer Barbara Thorne, is an easy-to-use diet and nutrition program. Keeping track of an individual's dietary habits over time in six nutritional categories, the software also analyzes the ingredients of the user's favorite dishes.

Krogh Wars. One gentleman who speaks highly of Muse is Frank Krogh, a *Robot War* fanatic of Reseda, California. Pre-*Robot War*, Krogh graced *Softalk*'s October 1980 issue in a story about an invention he had devised to facilitate loading data into the Apple from cassette tape. By the time *RobotWar* appeared, Krogh had moved up to disk. Since then, he has been carrying the torch along with other *Robot War* players who desire the competition and challenge of pitting robot against robot in a tournament setting.

On the local front, Krogh credits Rainbow Computing in Northridge, California, for continued support in providing an ongoing setting for the tournament. There's also a monthly postal tournament organized by Krogh that will culminate in a national championship. Entrants send him the code for their robot combatants on disk. He runs the various robots through their battle paces, and each participant receives a full report on the competition and the champion robot. It's a chance for seasoned *Robot War* aficionados and fledgling players to test their programming prowess.

As long as there are guys like Frank Krogh, whose contagious enthusiasm for a game keeps interest in it alive, companies like Muse Software will continue to produce the fun and challenge that merits dubbing a game *classic*. And with more and more creative people from all disciplines, like Robert Zraick, unlearning their prejudices against "those glorified calculators," a new generation of artists gleams on the horizon. No doubt that gleam will come in part from the metallic encasements of robotic companions that will be standing at our sides, joining us not only in contemplation of a byte, but in the creation of a world better suited for the men living in it, as well as the machines.

Next time in Backtalk, we'll get down to business and reflect on a company whose name has become a mere footnote in the microcomputer history books—Personal Software.

If you'd like to participate in Frank Krogh's Robot-War *tournaments, contact him at Box 5337, North Hollywood, CA 91616; (213) 885-8265.*

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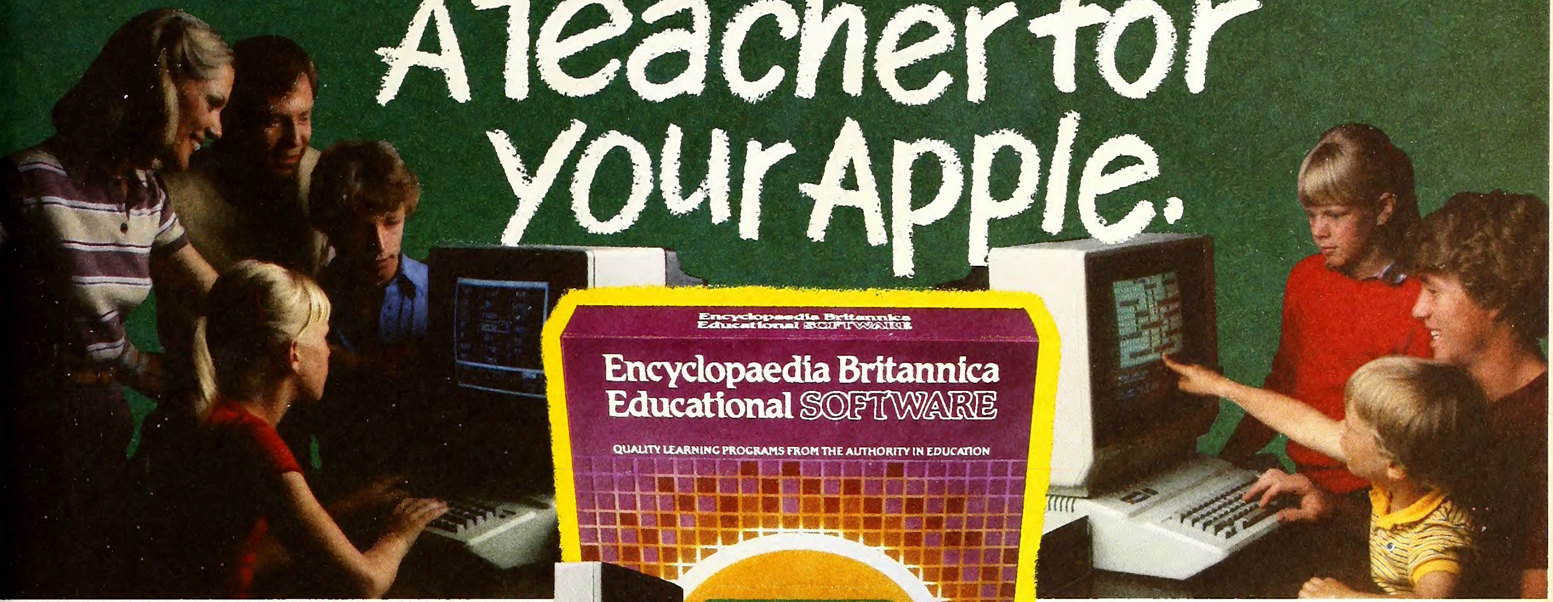

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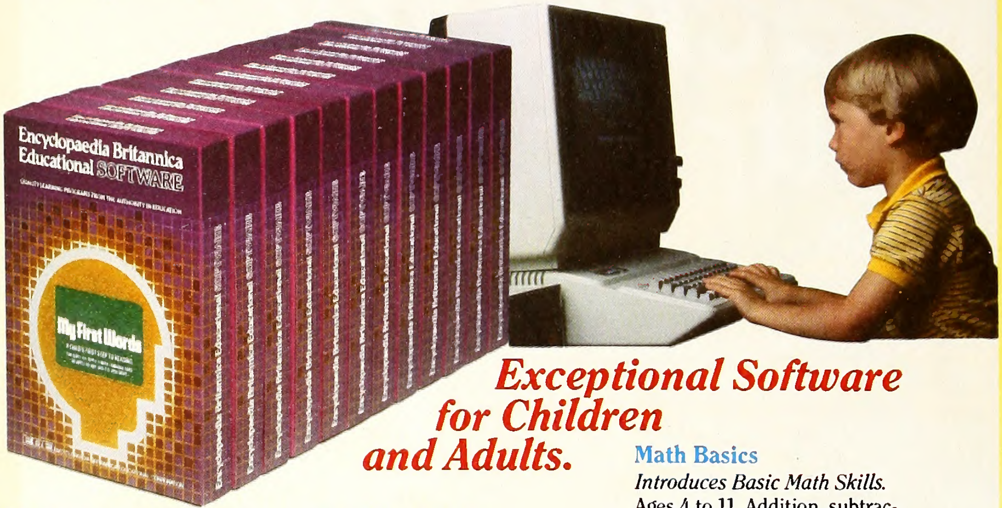

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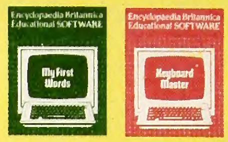

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BEGINNERS' CORNER

BY: MATTHEW YUEN

Let's face it. A big reason people buy personal computers is so they can play games. Lots of times people will tell you, "Yeah, I keep home records on it, do my finances, keep addresses, do business accounting on it, and I get a good tax write-off. Play games? Gee, I suppose I can do that, too."

What they really mean is, "I spent almost four hours working on my high score, but then the kids wanted to play *Zork*, so I let them on it awhile. One of these days, I'll get around to putting the family budget on it." Okay, so your own situation might not be that extreme. But games do spend a lot of time on those computer screens, and most of the time they're displayed using computer graphics.

Games certainly aren't the only place where graphics are used. Business programs depict earnings and expenses in the form of charts. Educational programs use colorful graphics to make learning seem like a game. There is even computer art: graphics for its own sake.

Whatever the application, graphics is one of the things computers create that many of us would have a hard time creating by other means.

There are two main graphics modes in which the computer does its stuff: low-resolution (lo-res) and high-resolution (hi-res). Resolution simply means image definition. With a high resolution, a picture can have smoother curves and greater detail than with a lower resolution. In the real world, there are many possible degrees of resolution.

When you look at a photograph in the newspaper, it appears finely detailed. But if you section off a small piece of it and enlarge it to the size of the original picture, the resolution isn't as clear; it loses detail, and you can see that it's nothing more than a bunch of dots. That's what lo-res is like, and that's what we'll look at first.

Jump Right In. Getting into the lo-res mode on the Apple involves nothing more than a few keystrokes. Assuming you're in text mode, just type *gr*, which stands for "graphics." You'll see the screen wipe itself clean and the prompt and cursor appear at the bottom of the screen. This is kind of like erasing words written on a blackboard in order to draw a picture in the same place.

Now that we're in graphics mode, what can we do? Well, to be honest, not much. We can put colored blocks on the screen, change colors, and that's about it, unless we learn to program. For many of us, learning to write programs will come soon enough. For now, we'll just try to understand how things work.

Once you're in graphics mode, type *color=2* and hit the return key. Next, type *plot 20,30*. Bingo, a purple block appears. Let's take a look at what happened.

Typing *color=2* lets the Apple know that whatever it puts on the screen, not including text characters, will be dark blue. In lo-res-graphics mode, you get your choice of sixteen colors, and in typical computer fashion they're numbered from 0 to 15. On the Sample Programs disk that comes with the Apple IIe, there's a program called *Color Test* (*Color Demosoft* on the System Master for II Plus fans). One of the items on the menu is called "Standard Color Names." This one displays the sixteen colors and their names; the item "Standard Color Numbers" displays the colors and their corresponding numbers.

When you type *plot 20,30* you're telling the Apple to put a block of whatever color you've chosen onto the middle of the screen. The lo-res screen is divided into a grid 40 blocks wide by 48 blocks in length. Also in computer style, these blocks are numbered from 0 to 39 and 0 to 47.

If you remember back to school days, pairs of numbers like 20,30 are known as Cartesian coordinates (after the philosopher, wonderful man, and almost personal friend Rene Descartes), but that's not too important. What is important is that these numbers represent a point on the screen in a way that's so simple, it's insulting.

The first number, 20, means column number 20; the second number, 30, means row number 30. They do *not* mean the twentieth column and thirtieth row (we began numbering with zero, remember?). So actually, column 0 is the first column, column 1 is the second column, and so on. If you wanted to plot a block on the far right-hand side, you would type *plot 39,X*, where 39 is the far right column and X is the row number.

Nothing's True All the Time. Let's backtrack for a moment. We said that the screen is 48 blocks in length, but, just like a lot of things in this business, that's not entirely true. If you try to plot any points in rows 40 through 47, well, just try it. Here are some:

```
PLOT 10,44
PLOT 22,45
PLOT 30,47
```

You don't get a color as you did in the other rows; what you get is a quotation mark, and you probably noticed that it scrolls up the screen and disappears like the rest of any text you type. That's because the bottom part of the lo-res screen is reserved for text material. It holds four lines of text, or eight rows of graphic blocks.

By now, if you've been plotting things left and right and up and down, you probably have a screen full of blue blocks, and it's getting boring. When the screen gets too full, you can get yourself out of graphics mode by typing *text* and then starting over.

The color=2 command will keep things in the blue until you tell it otherwise. Color=9 will change things to an orange flavor, color=3 will give you grape, and color=15 will make it snow.

Notice that when you enter a color= command, the blocks you already have on the screen remain their original colors; only the blocks you plot after a color= command will be of different colors. Play around with both of these for a while, and come back when you're ready to move on.

Back already? Good! You may have discovered by now that color 0 is black. Try this:

```
COLOR=9
PLOT 25,35
COLOR=0
PLOT 25,35
```

An orange dot appears, and then it's gone! If you have a colored block plotted somewhere and you want to get rid of it, change color to black (0) and plot a block in the same place as the one you want to take out. You're not really "erasing" the block, you're putting a black one in its place. It's a technicality, but the effects are the same.

How It Works. Want to know how all this stuff happens? Read on. If not, read on anyway.

The information that tells the Apple what colors to put on the lo-res screen and where to put them is stored in the same place in memory as the information for your normal forty-column text display (half of the eighty-column text-display information is stored there too, but that's a topic for some other time). In other words, the bytes in memory that put characters on the text screen are the same bytes that put blocks on the lo-res screen. You might guess that because of this you can't have the text and lo-res screens active at the same time. You're right.

That's why you can't see what you've typed once it moves above the bottom four lines; the lo-res screen is in the way. It's the same reason why you can't see what's written on the classroom chalkboard when you're watching a movie; the movie screen is in the way.

Each byte in this area of memory lets you put either one text character or two lo-res-graphics blocks on the screen. Text characters are put in an area that is eight dots tall and seven dots wide. If you look closely at the monitor, you can see that the characters themselves are only five dots wide with an empty column of dots on each side and seven dots tall with an empty row of dots between rows of characters.

Lo-res graphics, since they occupy the same memory location as text, use the same bytes in memory that the text mode uses. Therefore, lo-res graphics are put in the same eight-by-seven dot areas on the screen as text characters. However, whereas we can put one text character per area (byte), we can put two graphics blocks. Keeping things as nontechnical as possible, here's a brief explanation why.

Just When We Were Getting Used to Liters. Just as there are two half pints to every pint, there are two half bytes to every byte. Half pints have a name of their own, cups; half bytes also have a name, nibbles.

But unlike cups, each nibble goes on either the "high" end of a byte or the "low" end. For the benefit of the people who cut class when we explained this, a byte consists of eight bits. The low end of a byte consists of bits 0 through 3, the high end bits 4 through 7.

It's as though you had a pint jug with a partition in the middle and a spout on each side so you could fill each half of the jug separately; you'd still have a complete pint, but the liquid in one half would be separated from the liquid in the other half.

When you put a text character on the screen, you use up the entire byte (both nibbles) to create one thing, the letter "T," for example. If you wanted to take a pint of tea to Aunt Stella's, you'd fill one half of your divided jug with tea and then the other half, also with tea. Likewise, when you want to print a T on the screen, both nibbles are loaded with the information needed to make a letter T.

Sharing Memories. Lo-res graphics presents a different situation. You need just half a byte to put a graphics block on the screen. Take a look at one of those blocks. It takes up a space seven dots wide, like the text character, but only four dots high—half of what a text character uses. Because lo-res graphics and the forty-column text displays occupy the same places in memory, and because a graphics block uses up only half the area of a text character, it's logical to conclude that it's using only half the memory (half a byte) that a text character uses.

In graphics mode then, it's like Aunt Stella isn't that thirsty, so you don't have to lug a whole pint of tea over to her house. Instead, you can just fill up half the jug with tea and be on your way, just as you fill the memory location with half a byte of information to put a block on the screen.

Since one lo-res block uses half a byte, two blocks, one on top of the other, use a whole byte. Two blocks of the same color would put the same information in both halves of the byte (two cups of tea). But if you wanted different colors, you could type:

```
COLOR=8
PLOT 10,20
COLOR=9
PLOT 10,21
```

The result is that you get a brown block and an orange block in the same area (one byte's worth) that would hold one text character.

In this way, it's as if you weren't sure whether Aunt Stella preferred tea or orange juice. To save you the pain of having her yell at you for bringing the wrong drink, you fill one half of your special jug with (brown) tea and the other half with (orange) orange juice. Everyone's happy, and Aunt Stella remembers you when the winter holidays roll around.

That's basically how lo-res graphics works. You can do much more than just set colors and plot blocks, and if you're interested in going further, go through the Applesoft tutorial. It covers most of what you need to know about lo-res graphics.

Blocks Are for Blockheads. Hi-res graphics are the things real life is made of. When you walk down the street, you never see anything that even vaguely resembles lo-res graphics (a skyline from a distance, maybe). But the truth is that things made out of Lego blocks look just as good as objects drawn in lo-res, or sometimes better when you add wheels, hinges, pulleys, motors, and other new gadgets in Lego technology.

That's why we have hi-res—so we can create arcade games, graphics adventures, and business charts. Actually, hi-res graphics works very much the same way as lo-res. In both cases, you select a color, plot a point, plot another point, and so on.

You won't have a hard time picking up the hi-res words if you have a handle on lo-res commands. The gr equivalent for hi-res is hgr; color becomes hcolor, and plot becomes—you guessed it—hplot.

The hardest part is getting acquainted with the hi-res neighborhood.

The forty-by-forty-eight-block lo-res community is a village when compared to the hi-res metropolis. In hi-res, the screen is not defined by blocks, but by hundreds of dots. It measures 192 rows (numbered 0 to 191) by 280 columns (numbered 0 to 279). Weird numbers, huh? Not really. Remember that lo-res blocks are four dots tall (4 × 48 = 192) and seven dots wide (7 × 40 = 280).

Here we go. Type the following commands:

```
HGR
HCOLOR=2
HPLOT 50,110
HPLOT 52,110
```

If all went well, you should have two violet dots on your screen. Unless you have a color display, you're going to have a horrible time distinguishing colors. Just trust us. Keeping in the hgr mode, now try this:

```
HPLOT 101,110
HPLOT 171,110
```

Nothing. That's a weird thing about hi-res graphics; some colors appear on certain points and not on others. But it's not all that hard to figure out where they do and where they don't.

Odds and Evens. You can set hcolor to any value from 0 to 7, but you only get six colors. Confused? So was Arthur when he pulled Excalibur from the stone, but he got used to it. The colors green (1) and orange (5) appear only when you plot them in the odd-numbered columns; violet (2) and blue (6) appear only when you throw them into even-numbered ones.

You get two white colors to choose from (3 and 7). You can hplot both on odd and even columns, but there's a catch. The first white (3) appears as green in odd columns and violet in even ones; the second one appears as orange and blue in odd and even columns respectively. So why the heck are they called white?

When you have two dots of any combination of colors (except black) in adjacent columns, they blend to form white. You can't do this with any one color. Color 2, violet, as you remember, can be put only in even columns. So, you can't put two violet dots next to each other because they turn out black in odd columns. However, if you take a color like green that shows up only in odd columns, you can put it next to a violet dot, and they will appear as two white ones. Strange, but we're forced to live with it.

The white colors are the only ones that let you hplot points in adjacent columns. Odd gives you one color, even gives you another, and together they form white.

The Only Consistent Color. Suspiciously missing from all this color talk is black. Just as with white, you get two black colors to choose from (0 and 4). Luckily, one looks just like the other in odd, even, and consecutive columns. The reasons why there are two each of black and white are too complex to go into here. It has to do with the way the bits are organized inside the machine. Don't feel like we're skipping material, though; if you're really that interested in finding out why strange things like these work the way they do, you're probably motivated enough to open up the Applesoft and reference manuals and read about it.

Earlier we said that the hi-res screen is 192 dots tall. But if you tried to plot any points like 20,170 or anything with a second number larger than 159, you won't see it appear. It's the same reason why lo-res plots appeared as text characters near the bottom; that bottom area is reserved for text. Whereas text takes up lo-res rows 40 through 47, it takes up hi-res rows 160 through 191. Nothing appears below row 159 when you hplot there because, unlike lo-res, hi-res uses a different memory setup than text mode.

If you want to use the whole screen for hi-res fun and eliminate those rows of text, just type *hgr2* instead of *hgr* when you want to get into hi-res mode. You had better be an accurate typist, though, because whatever commands you type after that won't appear on the screen.

Again, to get back to the text mode, you just type *text*.

The hgr2 command doesn't just get rid of text at the bottom. It pulls

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out an entirely different hi-res screen, called hi-res page two. As you might guess, hgr is hi-res page one. Unlike lo-res and text modes, which reside in the same memory location, hi-res pages one and two occupy two different places in memory. Thus, you can draw something in page one and then switch to page two without disrupting page one. Unfortunately, it's not as easy as typing hgr, hgr2, hgr, hgr2, and so on. The hgr commands erase whatever page they turn on, but there are ways to avoid that. Again, if you want to get into this kind of thing, you'd better dig out the ol' manuals.

How It Works, Revisited. The forty-column text mode and the lo-res display are controlled by the same area in memory. In text, one byte controls one character; in lo-res graphics, it controls two blocks, one on top of the other. In hi-res, however, one byte controls one row of seven dots. Since eight rows of dots (eight bytes) stack up as high as two lo-res blocks (one byte), we can see that hi-res graphics uses eight times as much memory as its lo-res sibling.

It should be getting obvious that to draw a line from one end of the screen to the other, you'd have to plot 280 points. What a pain. Fortunately, that's all taken care of. Get into the hi-res mode, choose a color, and try this out:

```
HPLOT 0,0 TO 279,0
```

Ha! We just saved ourselves a lot of typing by plotting all 280 of those points with one command.

Now try this:

```
HPLOT TO 0,159 TO 279,159
```

What you should have is a giant Z on your screen. See, the hplot command can be used to draw whole lines so that we don't have to hassle with inputting points individually. Computers are meant to save us time, even though they sometimes seem to work against the cause.

The Shapes of Things. Even though it looks like we're drawing lines when we use hplot like this, we're really just drawing a lot of points one by one very quickly. Drawing stuff in graphics modes, both lo-res and hi-res, is nothing more than putting a group of points on the screen.

Suppose we wanted to combine hi-res dots in such a way as to make a little picture? We could select a color, plot some points, select another color, plot some more points, and so on until we had a picture of a rabbit. But that would be a pain and it would take a long time. Besides, there's no such thing as just one rabbit, so you'd have to do the same thing over and over until you had a huge collection of rabbits.

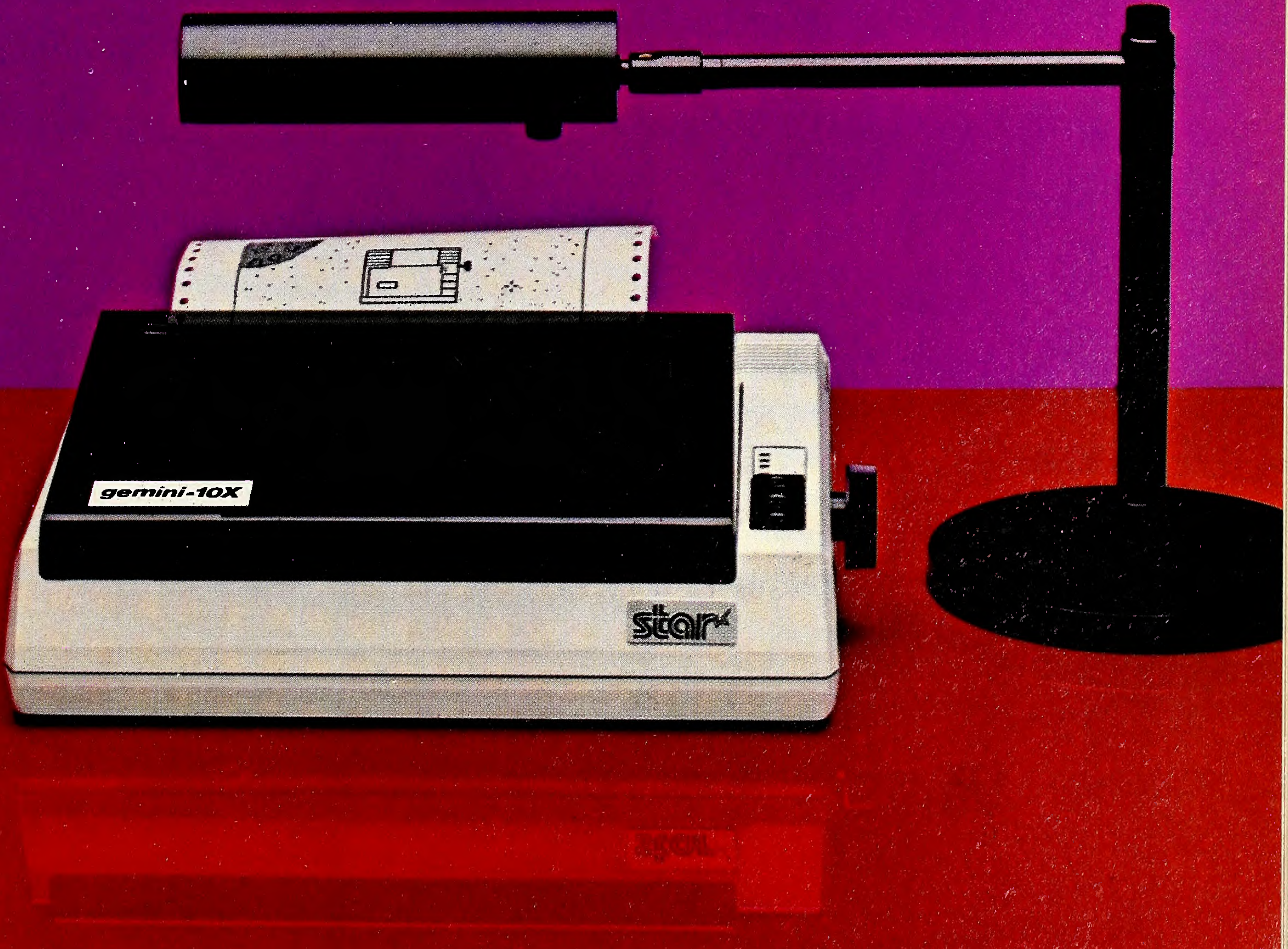
Serious programmers get around all of this repetitious nonsense by using things called shape tables. A shape table is a series of vectors that go from point to point, plotting dots on selected points while leaving other ones blank. The result is that the trail of dots the vectors leave behind forms a picture; in our case, it's a rabbit. The shapes in children's books that you form by connecting numbered dots are sort of like shape tables.

Once you have a shape table in satisfactory condition, you save it to disk as a binary file. When you want to let the rabbits come hopping onto the screen, you just load the shape table into memory and write a program that finds a point on the screen, says, "Put a rabbit here," finds another point, says, "Put another rabbit here," and so on until you have all the rabbits you need. Every time the Apple hears the program say, "Put a rabbit here," it reads the information in its memory that tells it how to draw the rabbit—the shape table—and draws it on the screen.

There are other Applesoft commands that let you rotate and change the size of your shape, just in case some rabbits start tumbling around or growing up.

This is generally how animation works. For film, an artist draws a series of pictures and then flips the frames. For computer games, the programmer creates shapes and plots them at different points on-screen to create the illusion of movement.

That's all we have space for this time. Next time, we'll kick off the academic year with some real meat: how computers count. Bring your abacus and a sixteen-key calculator.


gemini-10X
star

Opposite page: The whimsically futuristic foam house Xanadu gleaming in the Florida sun. Above: The talking TomorrowHouse test home in Denver, Colorado

Ask your house these questions the next time you walk in the front door:

What's the status of the lights, appliances, heater, fans, air conditioner, and other devices?

Did you remember to close the garage door?

Are there any appointments, chores, anniversaries, or birthdays to attend to, bills to pay, or pets to feed?

Is it cool enough outside to turn off the air conditioning and open the windows?

How did the solar water heater perform today? How cold did the greenhouse get, and when?

How many power failures, burglaries, and other nasty things happened while we were away?

Is the hot tub ready to use?

Tomorrow's Smart Caves. If your house remains silent under this barrage of queries, fear not. That just means you're living in a dumb manmade cave, as most of us are today. Tomorrow, homes will be smarter, in control, and talkative.

In the future, your home will do more for you than you ever dreamed—perhaps even more than you ever wanted it to do. Though some folks will always like living in caves, others have much grander notions about human habitation.

Currently, the house of the future comes in two models. Model one is smart as an Apple—because it runs on one.

It is available right now in the form of a computerized home control package. So far there are three such programs—*Tomorrowhouse*, *Waldo*, and the customized *Zygard* system, all of which will turn lights on and off, start your heater when it's cold, alert your security service in case of a break-in, and more.

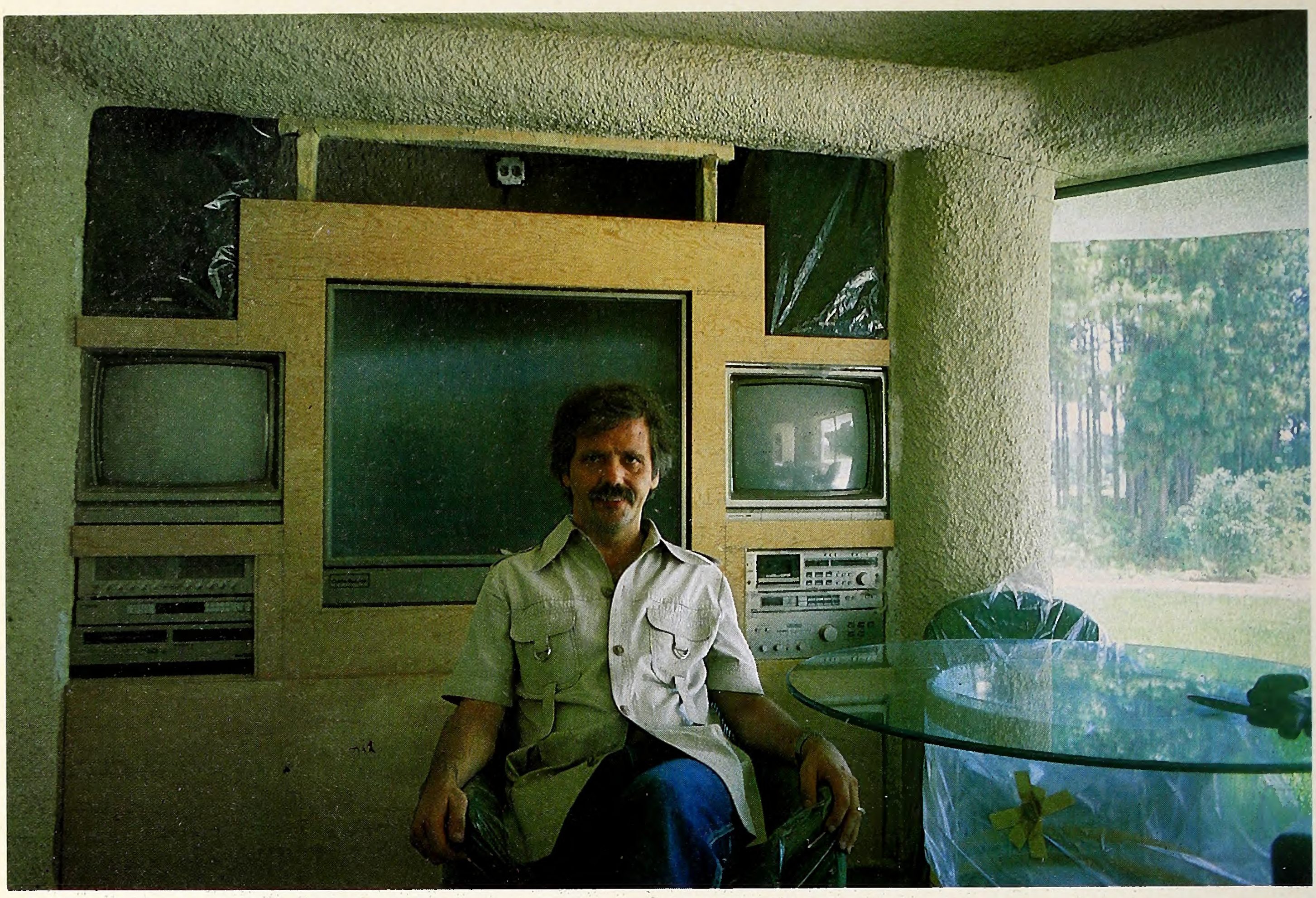
Model two, the superdeluxe version, requires a mainframe computer to function as its brain.

It is available to millionaires and those wishing to customize their present abodes over the next few decades. The prototype for it is a whimsically futuristic foam-dome house called Xanadu, after "the stately pleasure dome" decreed in Samuel Coleridge's poem "Kubla Khan."

The future has never looked more fun.

TOMORROW'S LIVING TODAY

by MICHAEL FERRIS



Futurist Roy Mason takes a breather in the unfinished hearth room of Xanadu.

Although the technology exists to make the dream house of tomorrow a reality today, few could afford it and no developer is cranking such creations out. However, "Xanadu—Home of the Future" is open to public scrutiny in the steamy wilds of Orlando, Florida.

No one actually lives in Xanadu. Rather, it beckons like a smart new lure in the world's greatest bait shop. Since July, visitors have been able to tour the "house with a brain" and catch a glimpse of a super-high-tech tomorrow.

Xanadu's sculptured-foam-insulation-sprayed-over-balloons construction is a radical departure from conventional home-building techniques. Most houses these days aren't round, and most houses these days don't have bubble-eyed faces for windows and exposed nervelike foam tendrils snaking over them.

If Xanadu looks a bit like an off-world dwelling from a science fiction film, that's because it's supposed to.

"People expect a house of the future to look unconventional," says Bob Masters, one of the partners in the ongoing project. The intended entertainment value of the dwelling contrasts nicely with the high-tech furnishings and concepts that went into its design.

Out of the Woods. This is the second house of the future conceived by Masters and his partner, Eric Walter. The first Xanadu was a summer season "curiosity piece" built in Wisconsin in 1968. It was small and uncomputerized but proved so popular that the partners decided, three years ago, to move to the more heavily trafficked Orlando area and build a bigger, more sophisticated year-round attraction.

Masters and Walter commissioned Washington, D.C., architect Roy Mason—a futurist with plenty of visionary zeal—to design Xanadu. They met Mason at a futurist's convention.

Mason has spoken and written about, and created films on, the subject of future architecture. Specializing in energy-conscious structures, Mason has created more than fifty contemporary homes incorporating the latest building technologies, from solar heating to foam to microcomputers. He's also one of the founders of the World Future Society and architectural editor of the group's *Futurist* magazine.

But he wouldn't agree to design Xanadu unless he could make it the world's first smart house: a house with a computer brain. Although most of what visitors see now at Xanadu are prepared demonstrations, a basement room is waiting for the house mainframe. Eventually all systems, from security to food preparation to communications, will be tied into the central computer for total environmental programming.

There's no more fitting place on Earth to create a vision of tomorrow than the tropical jungle surrounding Orlando. The countryside is overrun with epic visions—from orange groves to manmade wonders like Disney World (the crown jewel), Epcot (contender for the crown), Ringling Bros. and Barnum & Bailey's Circus World, Cyprus Gardens, and dozens of others.

Each theme park is more outlandish than the next: Each is an artificial paradise where only your sense of childhood wonder is real; and each is an engineering marvel in its own right.

It's the same with Xanadu, the new attraction in Florida's theme park paradise.

Every Bell and Whistle. A push-button pleasure dome, Xanadu is loaded with goodies: the Anova Master System, with its intelligent phone, light, and security control; the Atari Learning Center; the Curtis Mathes Home Entertainment Center; the Richmaid curvilinear kitchen; the Jensen Surround Sound system; the Beam central vacuum system; the Kallwell passive solar storage tanks; the Hastings sculptural bath; and the J.S. & A.—Gladstone robotic chess set.

An Androbot greets Xanadu's visitors at the front door. After a short introduction, visitors are given a hand-held walkie-talkie-like guide wand before embarking on a walking tour of a fictional millionaire's family home of the future.

Celebrity sound-alike voices in the guide wand tell about life in the house of the future. Jimmy Stewart chats about the electronic hearth;

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Computers come in two parts.

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Without software, a computer can't do anything. And vice versa. You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember it's the software that tells the computer what to do), it makes good sense to pick the software first.

Start by making a list of the things you want the computer to do. Possibilities include word processing, inventory control, accounting, graphics, recordkeeping—you name it, there's probably software that does it.

Next take your list into a computer store and ask the salesperson to demonstrate software that will do the things you want.

Even though you'll need a computer for the demonstration, keep in mind the computer is just a vehicle. The software is the driver. Once you've decided on software, picking the rest of the computer system will be that much easier.

The simpler the better.

Some people will tell you that software has to be complicated to be powerful. Nothing could be further from the truth.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you want to do without getting in the way.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

Simply see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask your friends who have them.

Or look at all the sales literature you can get your hands on.

But as helpful as that can be, there's no substitute for a live demonstration.

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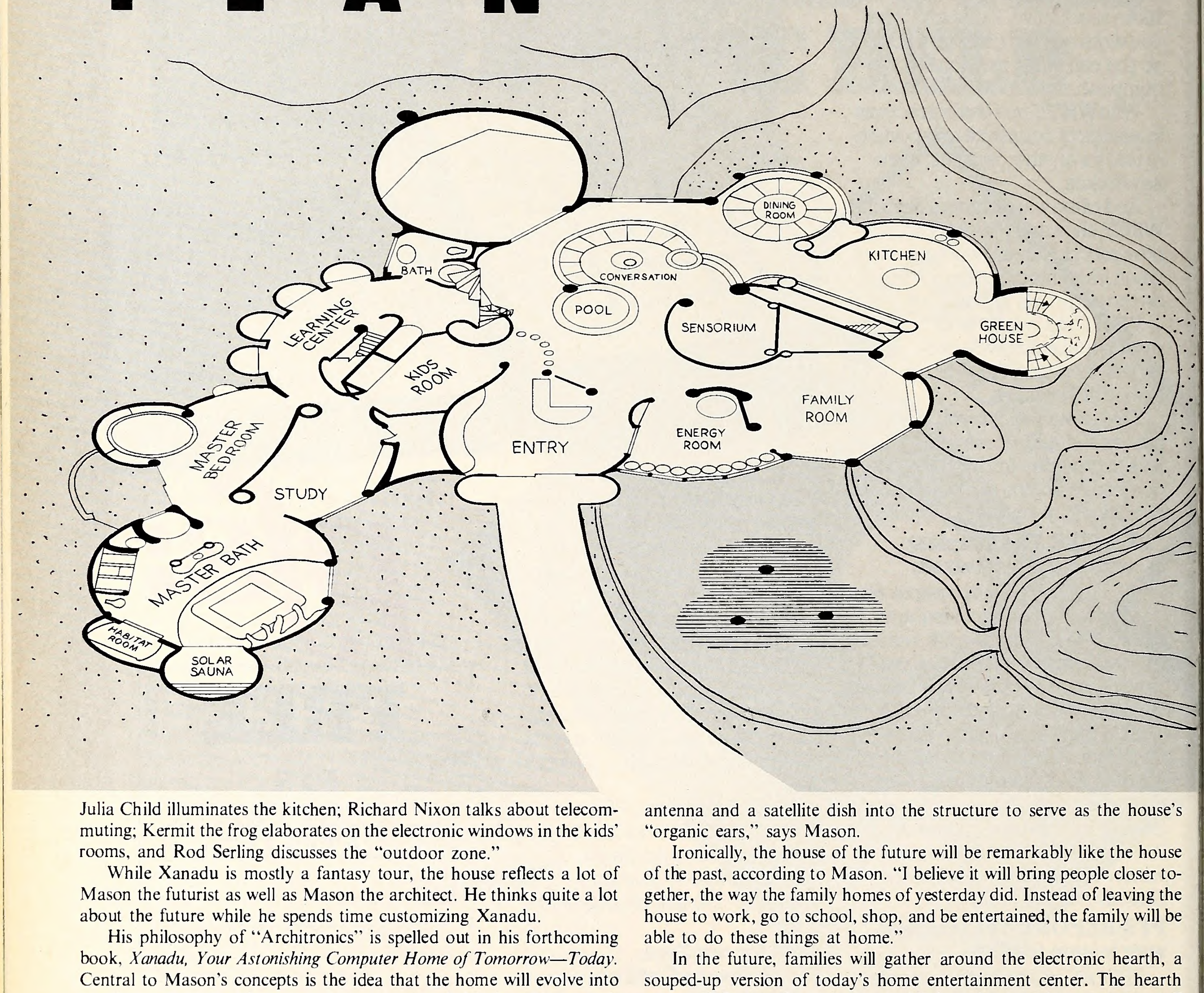


Julia Child illuminates the kitchen; Richard Nixon talks about telecommuting; Kermit the frog elaborates on the electronic windows in the kids' rooms, and Rod Serling discusses the "outdoor zone."

While Xanadu is mostly a fantasy tour, the house reflects a lot of Mason the futurist as well as Mason the architect. He thinks quite a lot about the future while he spends time customizing Xanadu.

His philosophy of "Architronics" is spelled out in his forthcoming book, *Xanadu, Your Astonishing Computer Home of Tomorrow—Today.* Central to Mason's concepts is the idea that the home will evolve into our "second skin" with its own nervous system (wiring) and communication between organs (appliance to appliance, including computers).

Ambidextrous Dwelling. This nervous system reports to a central brain (central computer). And this is where Mason's philosophy takes a very advanced turn.

"Like the human brain," explains Mason, "the house brain is divided into two functional parts. The left side of the brain performs all the housekeeping chores—controlling the heating, air conditioning, security, energy consumption, air quality, and lighting.

"The right side will be used to anticipate the needs of the inhabitants. In addition, the right side of the home brain will be used to connect the house to the outside world through banking, education, and communications networks." No more dialing the Source. The house of tomorrow will do it for you. There are also plans to build a microwave antenna and a satellite dish into the structure to serve as the house's "organic ears," says Mason.

Ironically, the house of the future will be remarkably like the house of the past, according to Mason. "I believe it will bring people closer together, the way the family homes of yesterday did. Instead of leaving the house to work, go to school, shop, and be entertained, the family will be able to do these things at home."

In the future, families will gather around the electronic hearth, a souped-up version of today's home entertainment center. The hearth room will feature the main terminal link to the central computer as well as to the outside world. The hearth room at Xanadu currently features an electronic art display—several large monitors featuring Niam June Pak-like graphics—built into an adjoining wall.

"The house brain on paper looks like a war room now," says Mason. "But it doesn't have to. Micro technology will keep making it smaller and smaller. However, the microchip isn't really the breakthrough here. The real breakthrough is the electronic symbiosis between people and machines."

Healthy Symbiosis. Such activities as conversation, meal planning, education, game playing, word processing, and family or individual therapy will be possible through the hearth's computer terminal, or through any of the terminals placed throughout the dwelling. Portable extensions of the hearth will exist in case a family member has to travel.

The therapy application of the system is a creation of Mason's. He eventually sees the creative right side of the house brain holding a database of behavior files on each member of the household. Inhabitants will be able to interact with the house shrink, so to speak, through voice-controlled programs in a therapylike situation.

Another room in Xanadu, called the Sensorium, is planned to be a mood room for one or more people. At present, this room is a theater where visitors may see a short film on how the house is constructed. Mason sees the Sensorium as eventually being able to pick up biofeedback information from persons inside it. It will also take cues from such things as after-dinner conversation. If dinner puts you in a classical mood, say so. The Sensorium will counter with a dose of Beethoven.

Liquid crystal walls, climate control, and music and sound will make the Sensorium a space-age meditation room. Throw in a mirrored ball and you get a terrific dance club. With the walls as screens, an armchair trip to the dead seas of Mars is not out of reach, provided we ever have film of the dead seas of Mars.

In the kitchen of the future, a robotic autochef will prepare prepackaged meals, hustling them from freezer to microwave. You may even want your "robutler," as Mason calls it, to serve meals. Planning menus, storing recipes, creating shopping lists, and juggling individual diet preferences will all be done on the built-in kitchen terminals. However, unless you want to exist solely on Le Menu frozen dinners, you'll have to do your own cooking.

Mason says that when you turn in after a hard day in the future, you'll crawl into a cocoonlike hole in the wall instead of a bed (to achieve heat conservation).

You'll be able to watch the sun rise on a large screen in your room—courtesy of your outdoor surveillance cameras. Your bedroom terminal will be at your fingertips. The question of what to wear (or what not to

From left to right: Xanadu from its main entrance, lit by the headlights of passing cars; from the center of the house of the future looking toward the dining room; the master bath doubles as a waterfall. Right: Russ Coffman stuck his one extra TomorrowHouse sensor in the fridge.

wear) to work will be easily solved—the only commuting you'll be doing is telecommuting from your own home.

If all these projections of a swell tomorrow sound expensive, consider Mason's hope to make it within financial reach of the average person. "You'll buy a house like you buy a car now. First the basic unit, with any extras you want installed before delivery, then accessories as you need them."

It's All Automatic, by George! While Xanadu is certainly an interesting vision of one man's house of tomorrow, you can have your first taste of similar luxuries by simply harnessing an Apple in your humble cave of today. Several currently available systems promise to turn any home into a small-scale Xanadu.

Customized control systems have been installed in various Pacific Northwest homes—and in one car—by Zena Micro Engineering of Seattle, Washington. The company's systems perform various combinations of household security and energy management.

Most of the homes are owned by families who have never touched a computer, says John Katzka, vice president and software guru at Zena. "Our challenge is not only to create a functional system," he says, "but to provide the training and handholding that goes along with a new computer in the home."

Up to twenty-four separate zones of protection can be addressed in hi-res graphics with Zena's *Zygard* system. The system's board, designed by Zena George, can interface with all types of sensors, magnetic door and window switches, step mats, smoke detectors, and so on.

The Apple's speaker is connected to the house intercom and can inform the owner of fire exits in an emergency, for instance. Also, calls can be automatically dialed and doors can be locked and unlocked from the keyboard with *Zygard*.

Energy management, such as monitoring room temperatures and

Temperature settings for up to nine days are done with bar charts.

controlling multiple heat pumps, is included in some of Zena Micro's custom systems. Temperature sensors open and close vents, dampers, and window shades. Effective monitoring and controlling of solar heat storage, fireplace heat recovery, and greenhouse temperature are among the home control applications the company has managed in these early days of smart housing.

The Omnus Security Controller, a residential and commercial standalone security system, is the company's latest accomplishment. Based on the Intel 8051 Micro Controller, the Omnus system can communicate easily with any of several brands of microcomputers, including the Apple.

Talking to Your House. Meanwhile, if you want to know if your lawn has been watered, you ask *Waldo*. If you want lights turned on and off, or the TV, you tell *Waldo*—a voice-activated house control system from Artra, based in Arlington, Virginia.

Waldo is "a *VisiCalc* for home control that works just like a spreadsheet," says company president Reuel Launey. "The homeowner creates action files, with time and date, to monitor appliances and such." Up to sixteen appliances can be hooked up to the system's card, as well as to alarms and stereo systems.

The package can call out preprogrammed reminders in a choice of human-sounding or mechanical Votrax voices. "It has a vocabulary of up to two hundred words," says Launey, "all the most common words used in running a household." By first teaching *Waldo* to recognize a phrase, you can ask it the time or to turn down the heat from as far as eight feet away.

"Already, some owners have equipped *Waldo* to respond to other than voice commands. It can listen for the doorbell, a crying child, or a burglar alarm," says Launey. "Quadriplegics and other handicapped persons can immediately use *Waldo* to voice-control their own environment to lessen the need for constant nursing."

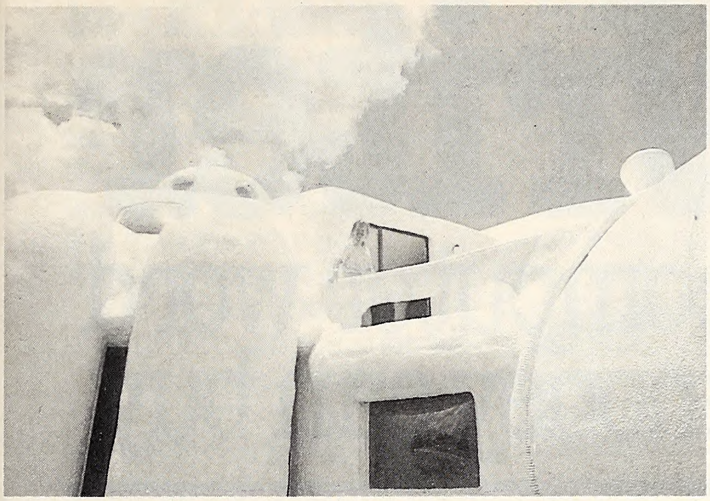
Just off the living room in Coffman's home is the passive solar-heat-collecting room.

Tom the Turnkey TomorrowHouse. What is it like to see your Apple extending itself throughout your house, looking, feeling, reacting—a micro extension of yourself? Russ Coffman of CompuHouse Systems in Denver, Colorado, knows what it's like. He's the creator of the TomorrowHouse computerized control system.

A demo version of his package is currently on display at Xanadu in Orlando and is to be hooked up for actual use in the near future. *Waldo* will also be eventually installed at Xanadu.

TomorrowHouse (Tom for short) is a complete turnkey control system. In addition to setting up the standard heating/cooling, lights/appliances, and alarm control, homeowners can define their own systems using a truth table method based on specified parameters.

Coffman has lived in a computerized home for the last three years—his home is the TomorrowHouse testing lab. "When I first designed Tom, I watched it like a hawk just to see how it worked," he says. "As the pace of adding new features slowed and I stopped waiting to see if my porch light came on when it was supposed to, my personal foreground became less cluttered with details."



Molded foam "nerves" snake up the outer shell of the Sensorium

The main benefit of having the system, Coffman would gradually learn, "was a subconscious feeling of peace of mind. I left home knowing things would be taken care of in my absence. The memo feature proved to be a lifesaver. I put my schedules out of my mind and let the Apple remember for me." A crisp voice nudges him about things he wants to be nudged about.

Even though his home was being run better than ever before, Coffman wanted more. "One can get jaded by even the most spectacular lifestyles," he says. "That's when I realized I wanted space-age convenience all the time." So he created version 2.0, with remote control. The computer can be accessed by any Touch-Tone phone, taking commands as well as inquiries on any part of the system's operations.

However intelligent a control system becomes, it can't predict a vacationing skier returning a day earlier than planned with a broken leg, says Coffman.

Xanadu designer Roy Mason speculates that in the future intelligent homes and entire smart-building communities will "compare notes" on energy use and other matters.

This is already possible with off-the-shelf technology such as *Waldo* (they're working on modem control) and TomorrowHouse. "Someday Tom will be able to start experimenting with the house's solar heating system on his own, finding out what parameters are most efficient without my reviewing his plots," says Coffman.

We're Not Obsolete Yet! Although computerized brains and machinery will be taking care of our future homes, for the moment it still takes humans to see that all this homey technology keeps progressing.

Funny thing about the future: It never really arrives. It's a projection, a hope, a fantasy of time—something we all peg our dreams to. That's why home system designers and futurists like Mason, Zena George, Katzka, Launey, and Coffman are busy creating the future today.

There's really no reason to wait.

Omnus Security Controller, by Zena Micro Engineering (4200 Twenty-third Avenue West, Seattle, WA 98199; 206-282-0100). $500. Contact Zena Micro Engineering for name of nearest Zygard *installation distributor. $200 to $3,000.*

TomorrowHouse, by Compu-Home Systems (3333 East Florida Avenue, Denver, CO 80210; 303-777-6600). Requires Thunderclock and Echo II speech synthesizer. $895.

Waldo, *by* Artra *(Box 653, Arlington, VA 22216; 703-527-0455). $599. Synthesized voice: $299.*

Xanadu, Your Astonishing Computer Home of Tomorrow—Today, *from Acropolis Books (2400 Seventeenth Street N.W., Washington, DC 20009; 202-387-6805). Hardcover, illustrated. $18.95.*

When in Florida, visit Xanadu—House of the Future, located at the intersection of U.S. 192 and S.R. 535. Open days and evenings, rain or shine. Adults: $4.50. Children under twelve: $1.

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Arthur Naiman, for one, in the "Word Processing Buyer's Guide" to be published soon by McGraw-Hill.

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PIE:Writer:	**Apple II, IBM PC**	**$149.95 $199.95**	**84¼**
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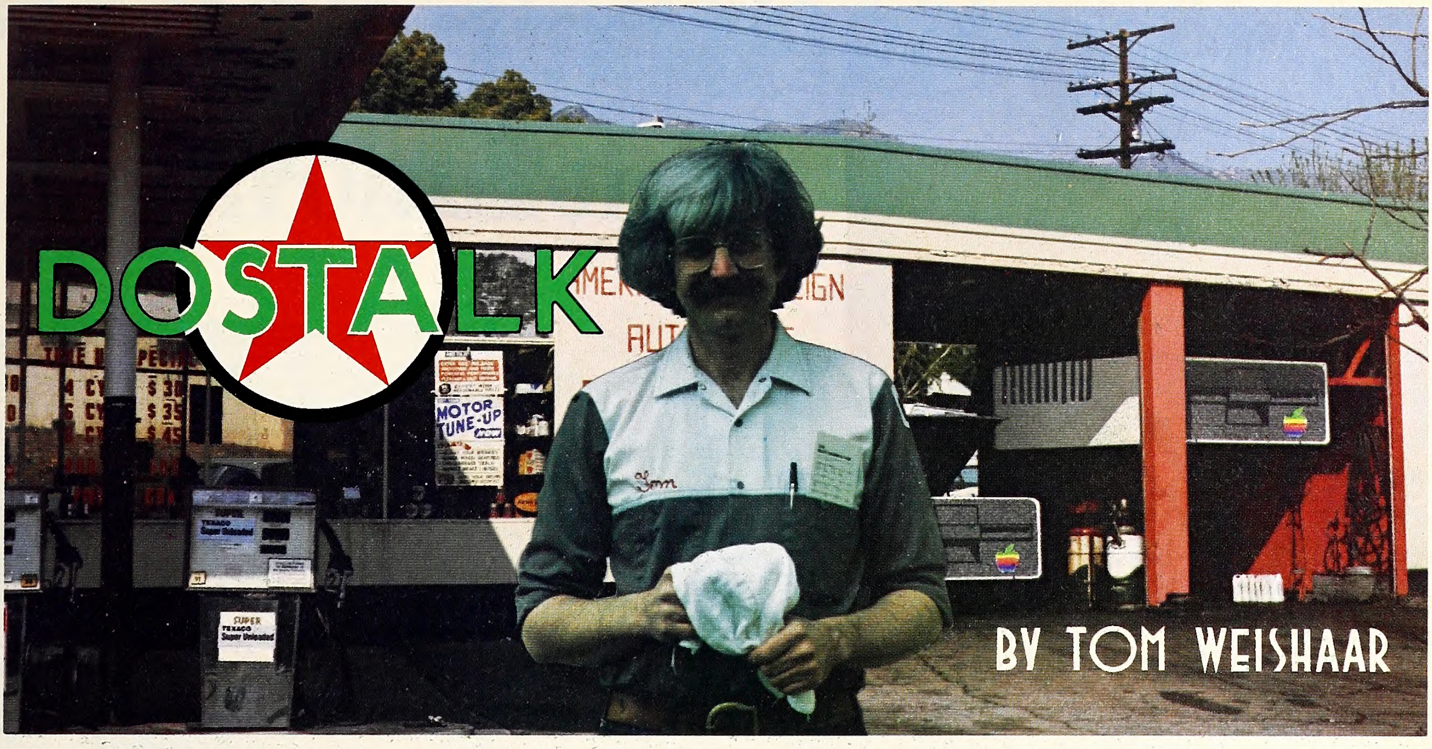
Write	CP/M†	$400	82¼

*Includes word processing hardware & multistation support.

†Requires additional CP/M Hardware for your personal computer ($200-600 extra)



Sometimes it seems as if God made Apple DOS from one of Basic's ribs. Apple DOS does lots of things in special ways for the sake of Integer and Applesoft Basic. This month and next we'll investigate the relationship between DOS and Basic.

One of the first things a beginning Apple user learns is what *catalog* does. Most of you know that the letter a catalog displays in front of each file's length and name indicates that file's type. Apple DOS uses four primary file types:

```
]CATALOG
DISK VOLUME 254
T 002 THIS IS A "TEXT FILE"
B 002 THIS IS A "BINARY FILE"
I 002 THIS IS AN "INTEGER FILE"
A 002 THIS IS AN "APPLESOFT FILE"
```

Text files are usually used to store data rather than programs. If you use a word processor, it probably saves your work in text files. Many database programs also store information in text files. Text files aren't associated with any specific computer language. All languages that operate under DOS can read and write text files.

Binary files hold "snapshots" of memory areas. When you save a binary file, you have to tell DOS the starting point of the memory area you want to save and how long the area is. DOS then creates a duplicate image of that memory area on your disk. You can reload the image whenever you like. Binary files are used for machine language programs and some types of data files. While binary files are used extensively by machine or assembly language programs, they can be used from any language. Like text files, they are not "language-bound."

The other two file types, however, are each closely bound to a language. Applesoft and Integer files are used only for program storage—never to store data.

There are three primary DOS commands for manipulating Applesoft and Integer files, and anyone who has read this far, with the possible exception of the author's mother, has used all of them at least once. They are *load*, *run*, and *save*.

Loading Programs and Running with Them. These three commands work almost exactly the same way whether they're used from Integer or Applesoft Basic. To operate as a DOS command, each of the three commands must be followed by the name of the file you want.

If you leave out the file name, load and save will seem to hang up your computer. The cursor will disappear, the keyboard won't respond, and your computer will appear to be dead. Leaving out the file name has the effect of telling Basic to load or save using a cassette tape recorder; it's now waiting for you to turn the recorder on. Just press reset to recover. Typing run without a file name will work if there is a Basic program in memory.

When you remember to use the file name, load gets the designated program from the disk and puts it into your computer. Load also does some lesser-known things, such as erasing any program previously in memory, switching versions of Basic if necessary, and closing any opened files. Run does everything load does, and it also starts up the designated program after loading it.

From Applesoft, load clears all variables. From Integer Basic, it does not. For example, if you are using Integer Basic and you tell the computer *A$ = "DOStalk"*, then load a program and ask Basic to *print A$*, it will respond "DOStalk." If you do the same thing while using Applesoft, you will get nothing but a blank look. New readers are hereby warned that this sort of interesting but useless information is typical of this column.

There are three error messages you will occasionally encounter when loading and running Basic programs.

Language not available indicates that the correct version of Basic isn't available on your computer. We'll discuss this in detail later.

File type mismatch indicates that you just tried to load or run a binary or text file. You can't do it. Only Applesoft and Integer Basic files can be loaded.

File not found usually indicates that you misspelled the name of the file you wanted to load, although sometimes it indicates that the disk you thought was in the disk drive isn't really there.

But Who Will Save Us from Ourselves? Save doesn't do anything special other than transfer the program currently in memory to the disk. Everyone quickly learns that if you save a program under the same name as another program, the new program will replace the old. The old—gulp—will be gone forever. This will happen without warning—no questions asked.

There are several errors you will occasionally see when using save. *Write-protected* indicates that somebody doesn't want you saving stuff on the disk currently in the drive. To write-protect the disk, this "someone" covered the square notch on the edge of the disk with a piece of special tape. To unprotect it, simply peel the tape off.

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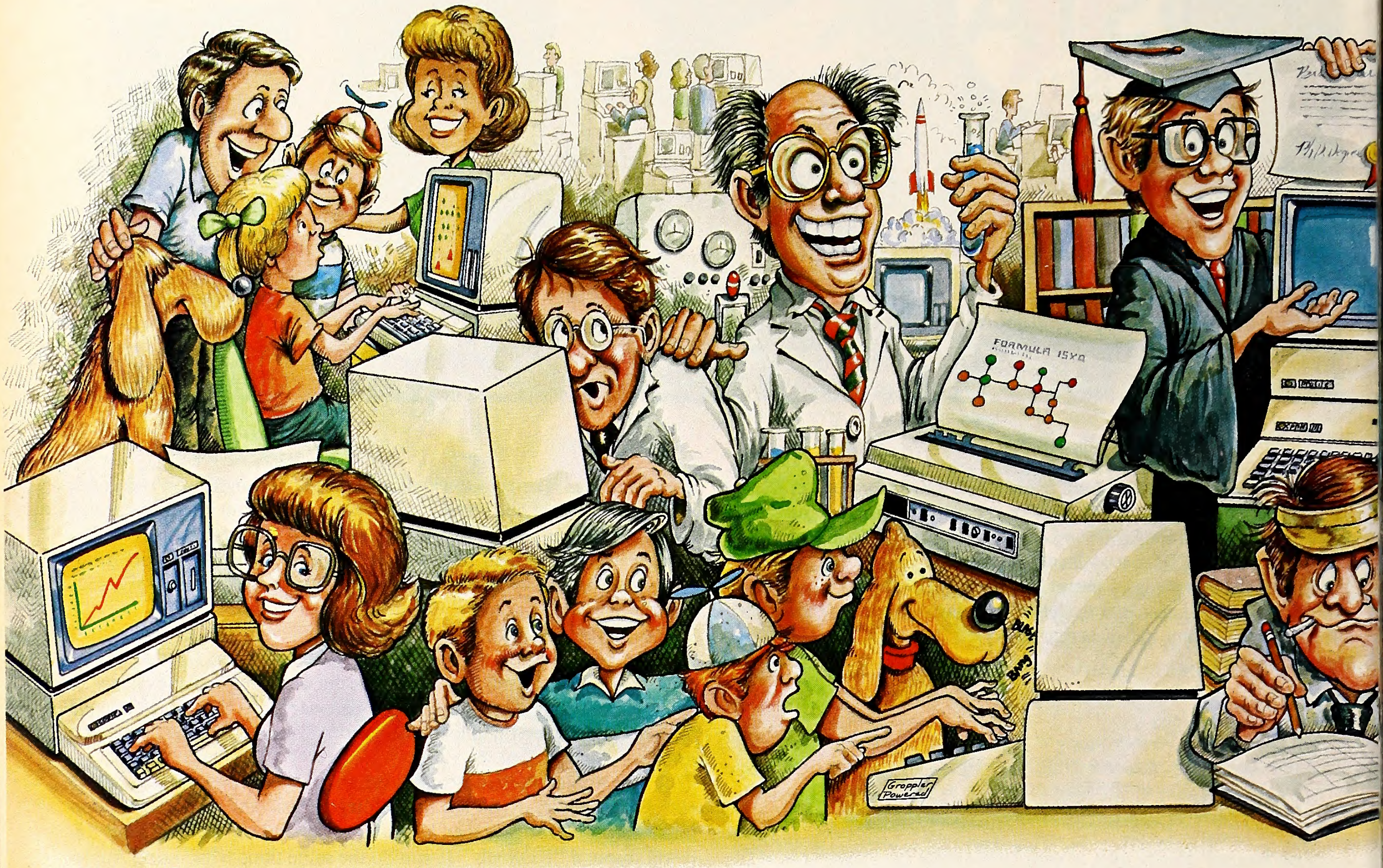

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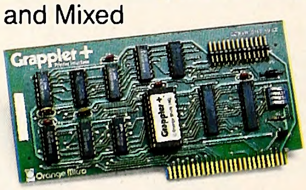

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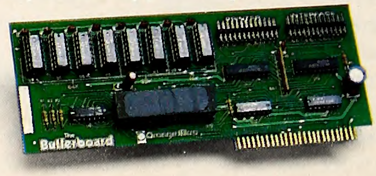

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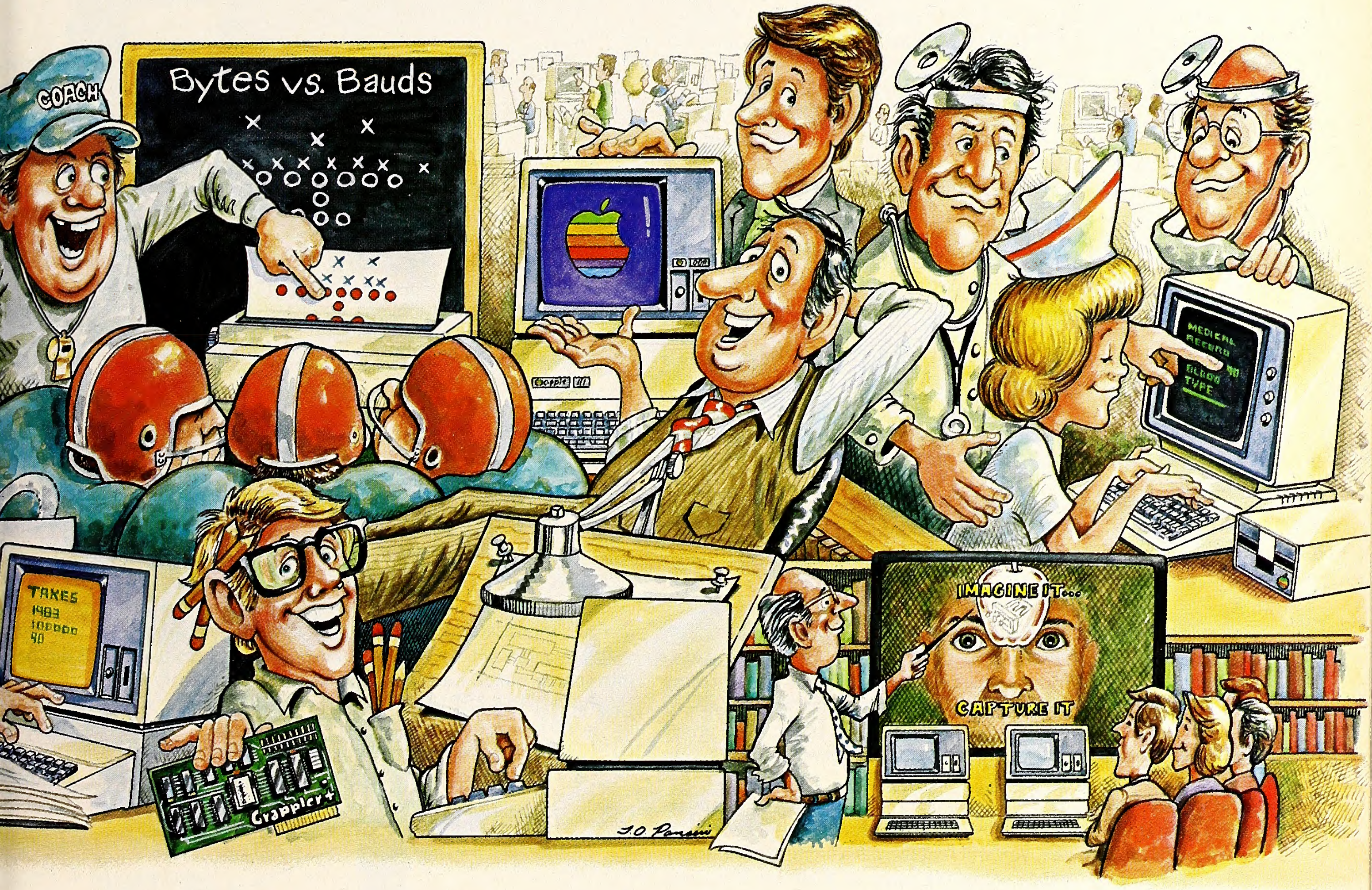

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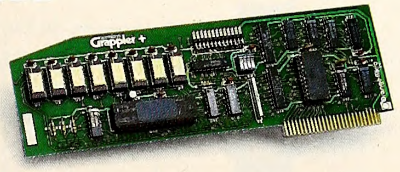

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File locked is similar, but without the tape. Use the DOS *unlock* command for quick relief. *File type mismatch* indicates that you have tried to save your program under a file name already being used by a binary or text file or by a program in the alternate Basic. Uncle DOS won't let you save an Applesoft program in an Integer file or vice versa.

Note that if you misspell a file name while saving, Uncle DOS won't know the difference. He'll create a new file with the misspelled name and put your program in it. This can create a great deal of confusion.

Imagine you have spent the evening working on a program called *Beer Inventory*. During the course of the evening, you saved it twice. Just before going to bed, you save it the final time but mistakenly type *Bear Inventory*.

The next day, when you reload the program, a whole bunch of work will be missing. Go ahead, scream and howl, but before killing yourself for forgetting to save your work, do a catalog and check for a misspelled file name. It could save your life.

A Very Rusty Chain. At the extreme opposite end of the usage spectrum from load, run, and save is a DOS command called *chain*. This command can be used only with Integer Basic files and allows you to link together Integer programs that won't all fit in memory at once. At the end of the first program you chain to the second, and so on.

Chain is very similar to run. The only differences are that it doesn't close open files and it doesn't reset all variables to zero. (Run clears Integer Basic variables; load and chain do not.) This means that programs linked together with chain can easily use data left by previous programs and easily leave data for following programs. Unfortunately, you can't link Applesoft programs together with this command. Because of the way Applesoft stores variables, any values are wiped out by the act of loading a new program, whether with load, run, or save.

It's interesting that when you try to use chain with Applesoft, you do not get a "file type mismatch" error, which is what would make sense. Under Applesoft, chain duplicates the load command, except that it doesn't close open files. Somebody somewhere might find a use for chain with Applesoft yet.

Relationships Revisited. The April DOStalk discussed init and booting. Init shows the family relationship between Uncle DOS and Basic to be glaringly obvious. Init saves whatever Basic program is in memory onto your newly formatted disk. Booting or starting up that disk causes Uncle DOS to run the same program automatically. In the April article you saw how to break up the family just a little by getting Uncle DOS to brun or exec your hello program.

In May we discussed the DOS commands pr# and in#. The family relationship here is somewhat less obvious. If you look in both your DOS and Basic manuals, however, you will find these two commands listed in both places. The only other commands listed in both are load, run, and save.

Yet the load, run, and save commands of DOS are distinguishable from their Basic counterparts by whether you need to give a file name with them or not, as we discussed a few paragraphs ago. The pr# and in# commands are the same under both Basic and DOS.

These commands let you turn on peripherals such as printers and modems. They work by changing the addresses in the *I/O links*. As we have discussed in previous columns, the I/O links are DOS's only connection to the outside world. When Uncle DOS does a pr# or in# command, he takes note of where you want output to go or input to come from, but he leaves himself connected to the I/O links. Basic, on the other hand, disconnects DOS when it executes pr# or in#.

When you type a pr# or in# command on your keyboard, Uncle DOS always intercepts and executes it without even telling Basic what happened. When you use pr# and in# in a program, however, the results depend on how you enter the command. Either of the following two lines will be accepted (there will be no syntax error).

```
10  PRINT D$;"PR#0"          (correct)
10  PR#0                     (incorrect)
```

The first line is a DOS command. This is the correct way to use pr# or in# from within a program. If you use the second version, which is a Basic command, DOS will be disconnected and will cease to function. Any DOS commands that follow will appear on your screen (or printer if you gave its slot number) rather than being executed.

The process of debugging this mistake can be very confusing because it is not always obvious that you have disconnected DOS. If you don't also change the input link with in#, your next input statement or the end of your program will reconnect DOS. Try this, for example:

```
10  D$ = CHR$ (13) + CHR$ (4)
20  PR#1
30  PRINT D$;"CATALOG"
40  INPUT A$
50  PRINT D$;"CATALOG"
60  END
```

If you have a printer in slot 1, the first print statement will send the word *catalog* to your printer. Because the Basic pr# command in line 20 disconnected Uncle DOS from the output link, he can't intercept the command.

DOS is still connected to the input link, however. So when line 40 is executed, DOS regains control. After you enter something, DOS will put his own addresses in both the input and output links. Thus he intercepts the second catalog command and executes it.

The catalog DOS creates in response to this second command will appear on your screen—not on your printer. Remember that DOS never saw the pr# command in line 20. As far as he knows, the current output device was never changed.

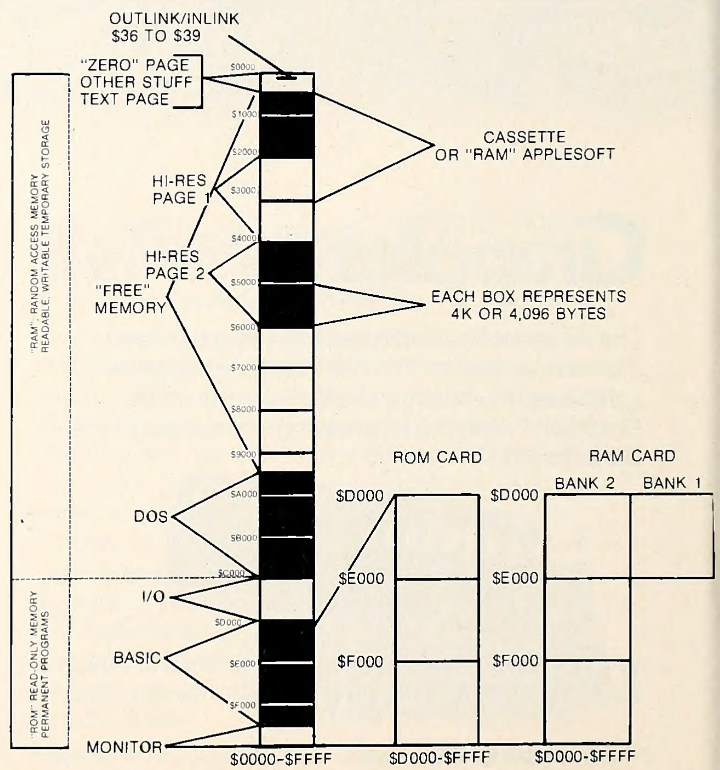
Now make the following change and try the program again:

```
20  PR#0:IN#0
```

This line will disconnect DOS from the I/O links completely. All DOS commands, both within programs and from the keyboard, will cease to function. To reconnect DOS, enter *call 1002*.

Home, Home on the ROM. If everything up till now hasn't proved Uncle DOS was created as a helpmate for Basic, *fp* and *int* will. These commands switch your computer between Applesoft (floating point) and Integer Basic. First let's look at how this is possible.

The shaded bar in the accompanying figure is making its fourth consecutive appearance this month. It shows how the memory space in your Apple is organized. Take note of the horizontal lines that divide this bar into sixteen boxes. Each box represents 4K of memory. One K of computer memory is about a thousand bytes—1,024 bytes, to be exact. Thus 4K is 4,096 bytes (in hexadecimal that's $1000).



Apple II Memory Map

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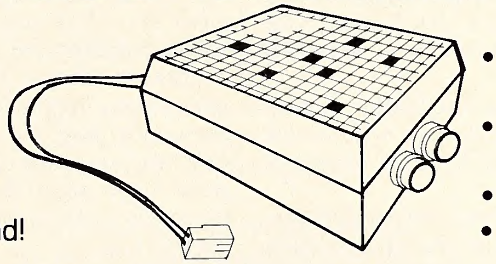

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When you add together the bytes inside each of the sixteen 4K boxes, you have 64K, or 65,536 bytes. This is the maximum amount of memory your Apple is capable of addressing or using directly. All Apples have the inherent capability of addressing this much memory and no more.

The leftmost bar in the figure divides this 64K of memory into two pieces—a 48K hunk of RAM and a 16K hunk of ROM. As the figure shows, the RAM area is temporary memory. When you turn the computer off or write something down in this area, whatever was there before disappears. The ROM area, on the other hand, is permanent. Neither turning the power off nor trying to write in this area will change it.

When you see computer manufacturers bragging about how many K of memory their computers have, make sure they are talking about RAM memory. This is the only kind you can use for your own programs and data. Sometimes manufacturers hide ROM memory in their specifications. The amount of ROM indicates how many programs are built into the computer. The built-in programs are useful, but RAM memory is much more flexible than ROM, as we'll see in a moment.

In the Apple, Basic is allotted the address space between bytes 53248 ($D000) and 63487 ($F7FF), as shown on the memory map. There is only enough room here for one version of Basic. Applesoft, which is built into the Apple II Plus and IIe, uses all of it. Integer Basic, on the other hand, starts at byte 57344 ($E000). The address space from 53248 ($D000) to 57343 ($DFFF) is empty on Integer Basic Apple IIs.

Green Apples. When the first Apples were manufactured, neither Applesoft Basic nor DOS existed. The first version of Applesoft Basic released was known as cassette, or RAM, Applesoft. It came on a cassette tape and was designed to be loaded into the RAM memory area from byte 2048 ($800) to byte 12288 ($3000).

Locate this area on the shaded bar and you'll see that it includes half of the first hi-res-graphics page. Because of this, cassette Applesoft wouldn't work with any programs that used hi-res graphics. This contributed significantly to its short life span. Recently, writers in various publications have referred to cassette Applesoft as an imaginary language, as if it never really existed. It existed; what requires imagination is remembering that, in its day, cassette Applesoft was considered a major enhancement to the Apple II.

It was during the exciting and turbulent age of cassette Applesoft that good old Uncle DOS was born. The heritage of those early days of Appledom still flows in his blood. Uncle DOS includes several scattered routines that allow cassette Applesoft to be used with DOS. The DOS manual uses the alias "disk Applesoft" when referring to these powers.

When you tell Uncle DOS to load or run an Applesoft program on a computer that doesn't have Applesoft available, Uncle DOS looks on the disk for an Integer Basic file called Applesoft. If he finds it, he loads it and runs it first.

The Integer file Applesoft is supposed to contain cassette (or disk) Applesoft, but it never does. In fact, there seems to be no evidence that Apple ever actually released a version of cassette Applesoft on disk. If any of you know differently, let us know.

Instead, the Applesoft file that you'll find on many of your disks contains an Integer Basic version of that disk's hello program. For example, if you look on your DOS System Master disk, you will find a program called *Applesoft*. (List it and compare it to the program called *Hello*.)

When you boot a System Master disk, the program *Hello* will run if you are using an Applesoft computer. On an Integer model, however, DOS won't be able to run *Hello*; instead he'll run *Applesoft*. This allows the disk to boot on either type of computer.

If you ever use this trick, your Integer program named *Applesoft* should end with a *call 979* or a *print d$;"int"* rather than with *end*. When you end one of these special *Applesoft* programs in the normal way, Uncle DOS loads and tries to run the real hello program. Remember that it thinks the file called Applesoft held the Applesoft language, not an alternate hello. Our little bilingual trick leaves Uncle DOS very confused when you end it. The solution is to cold-start DOS, which either of these two commands will do.

Applesoft Ripens. Cassette Applesoft gave owners of the original Apple II a new, more powerful version of Basic. However, it was soon overshadowed by the development of the Applesoft ROM card. This card contains the Applesoft language in permanent, ROM-type memory chips. It also contains circuits that can fool the Apple into thinking the ROM chips on the card are the ones built into the computer.

If you look back at the memory map, you'll see that the middle bar shows the address space used by a ROM card. When you plug a ROM card into your computer, the computer suddenly has 76K of memory—the normal 64 plus 12K on the ROM card. Yet, as mentioned earlier, the Apple can only address, or directly use, 64K. As a result, the two Basics must share the same address range. You switch back and forth between languages by throwing soft switches on the ROM card. (We talked at length about soft switches in this column in May.) When the ROM card is on, it tricks your Apple into thinking its ROMs are the built-in ones. When it is off, your Apple uses its own ROMs.

Uncle DOS was designed to work with ROM card Applesoft as well as with cassette Applesoft. When you tell Uncle DOS to load or run an Applesoft program on an Integer computer, he actually looks for Applesoft on a ROM card first. If he finds it, he turns on the card rather than trying to run the cassette version of Applesoft.

DOS has one limitation here—it expects the card to be in slot 0. If the card's in another slot, DOS won't find it. You can fix this, if you have a ROM card you'd like to use in another slot, with two simple pokes. These pokes change the address of the soft switches Uncle DOS throws while looking for the card. With *romslot* equal to the number of the slot you have your ROM card in, type:

```
POKE -23112, 128 + (ROMSLOT * 16)
POKE -23104, 129 + (ROMSLOT * 16)
```

It's worth mentioning that an Integer Basic ROM card was also developed for use in Applesoft computers. Everything we've said applies equally well to it.

Changing ROM into RAM. ROM cards were a good idea, but then Apple came up with something even better, the language card. Instead of unchangeable ROM chips, the language card uses readable, writeable RAM-type memory. A language card can be loaded with Applesoft on an Integer Basic computer (using the System Master's alternate hello program, *Applesoft*, that we discussed earlier); with Integer Basic on an Applesoft computer; or with Pascal on either model. In addition, there are a multitude of other uses for the card—many of them not yet invented.

Instead of holding just 12K of additional memory like the ROM cards, the language card was designed to provide Apples with an additional 16K of RAM memory, bringing the total RAM up to a nice, even 64K. Similar cards made by companies other than Apple are usually called 16K RAM cards. The Apple IIe comes with the equivalent of a built-in language card.

The 4K difference between the 12K ROM cards and the 16K RAM cards added a disproportionate amount of complexity. As you can see on the memory map, the address area from byte 49152 ($C000) to 53247 ($CFFF) is dedicated to input/output functions—soft switches and programs for peripheral cards. It would cause all sorts of problems if using the additional 4K of memory on the language card turned off access to the I/O area.

Rather than use the address space of the I/O area, the language card has two banks of RAM that share the address space from 53248 ($D000) to 57343 ($DFFF), as shown on the memory map. Basic uses one of these banks and leaves the other empty. The banks are selected by throwing soft switches.

Because of the two banks and because the language card can be write-protected, eight soft switches are used to control the card, up from only two on ROM cards. The switches were selected in such a way, however, that the same two that turn a ROM card on and off will turn a language card with Basic on and off as well. It all means that Uncle DOS doesn't know the difference.

Now Then, about FP and Int. When Apple introduced the language card, it was offered only in a package with Apple Pascal. Purchasers who wanted to use it for the alternate Basic were often surprised to find that the two Basics were included not with the language card but with DOS 3.3. Next time you look at your DOS System Master disk, find the binary files called Fpbasic and Intbasic. These files are the machine lan-

guage images that may be loaded into the language card.

When you give Uncle DOS the int or the fp command, he tries to turn on the designated language by throwing switches. If he's looking for Integer Basic and he still hasn't found it after looking at the ROM/RAM card, Uncle DOS will send you a "language not available" error message.

Uncle DOS, by himself, is not smart enough to load Fpbasic or Intbasic into your language card.

It's the System Master program *Hello* that knows how to load Intbasic; the program *Applesoft* loads Fpbasic. You cannot successfully load either language by using the bload command. This is because the soft switches must be set correctly to write-enable the language card before the bload. *Hello* and *Applesoft* do this.

When you boot the DOS 3.3 System Master disk, it will always load your language card with the appropriate language for your computer. If the computer's native language is Applesoft, *Hello* will run and load Integer Basic. If the computer's native language is Integer, DOS will be unable to run *Hello* and will run *Applesoft* instead, thus loading Applesoft Basic into the language card.

When Uncle DOS successfully finds a new language on a ROM or RAM card, he turns the card on and cold-starts himself and Basic. The cold start takes care of everything that needs to be done to put Basic and DOS on friendly terms. During the cold start, DOS fills in a table called the language vector table, which is inside DOS itself; executes a nomon command; rebuilds three DOS buffers; resets himem to just below the buffers; and cold-starts the new language. This erases any program already in memory.

It's important to realize that these things would happen even if you were already in the designated language. Typing fp when you are already in Applesoft is like typing new, nomonico, and maxfiles 3 all at once.

If you ever receive a "program too large" error while trying to load or run a program, you can almost always clear up the error with an fp or int command. Usually this error is caused by an abnormal himem value, which the fp or int will clear up.

How Entire Languages Disappear. DOS also clears the language card whenever it is booted. During a boot, Uncle DOS stores a zero in the byte he later uses to determine if a language is on the card. He does this so that a correct, but random, number in this byte won't trick him into thinking Basic is on the card. This is a nice safeguard, but it causes lots of trouble.

The problem is that you can't load your language card from one disk—your System Master, for example—and then boot a second disk that uses the language. The second boot effectively erases the language card.

The solution to this problem is another series of pokes into DOS. These pokes must be made to the DOS on the second disk. Putting these pokes into the DOS on the first disk will have no effect.

A good method to use is to boot a System Master disk, make these pokes, then initialize a new disk. This new disk will then boot without destroying what's on the language card. The pokes are:

```
POKE -16429,234 (was 141)
POKE -16428,234 (was 0)
POKE -16427,234 (was 224)
```

In hexadecimal, this address range is \$BFD3−\$BFD5 and the new value is \$EA. The old values are \$8D, \$00, and \$E0.

An alternative method is to change these three bytes directly if you have a program that will allow you to write on a disk. They appear on track 0, sector 9, bytes 211 to 213 (\$D3−\$D5).

All commercial programs should include this change. Otherwise those users who depend on the language card for the required version of Basic will be unable to boot the disk.

This month we've looked at all the DOS commands that have special features for the sake of Basic. Next month we'll look at how DOS handles errors for Basic's sake and see what has to be done to get Uncle DOS to do his stuff for other languages. See you then.

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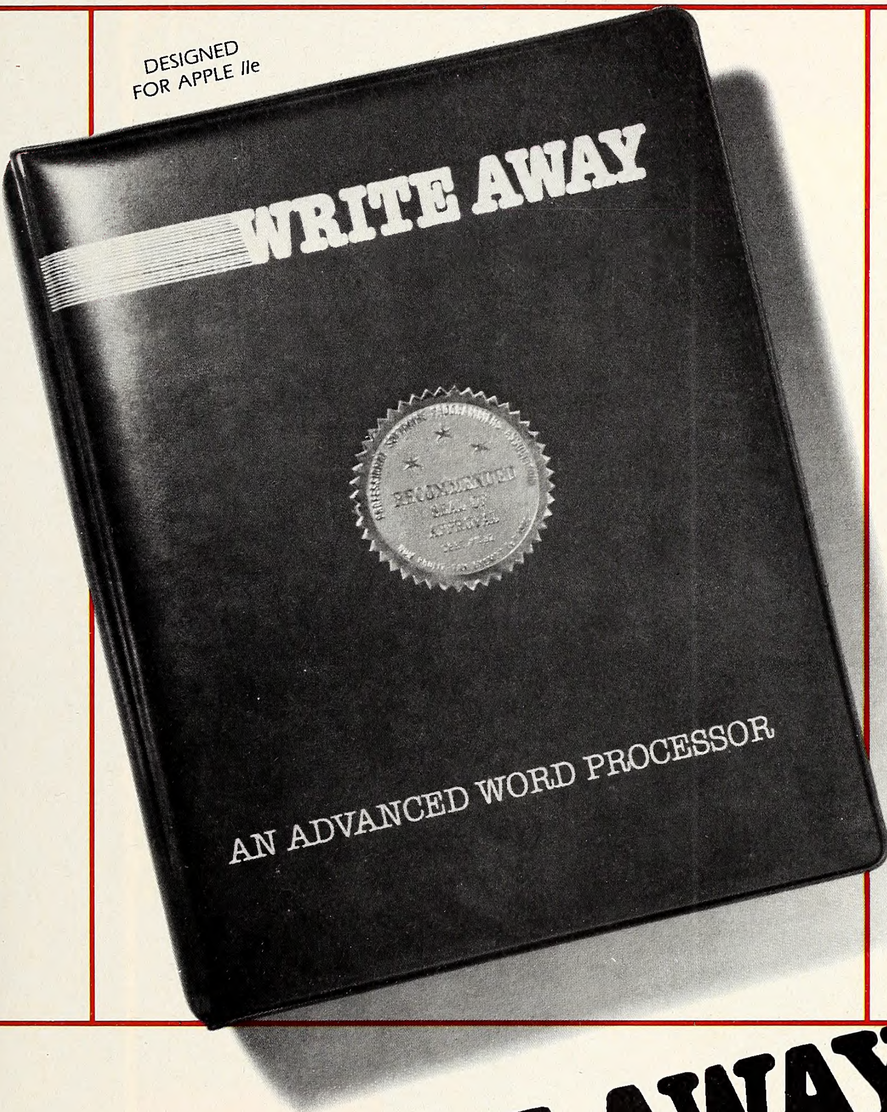

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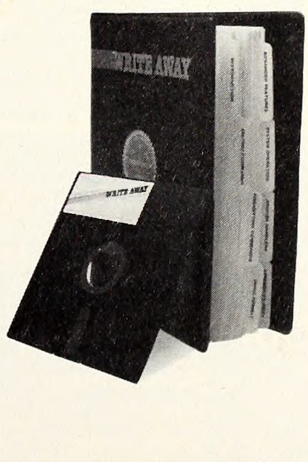

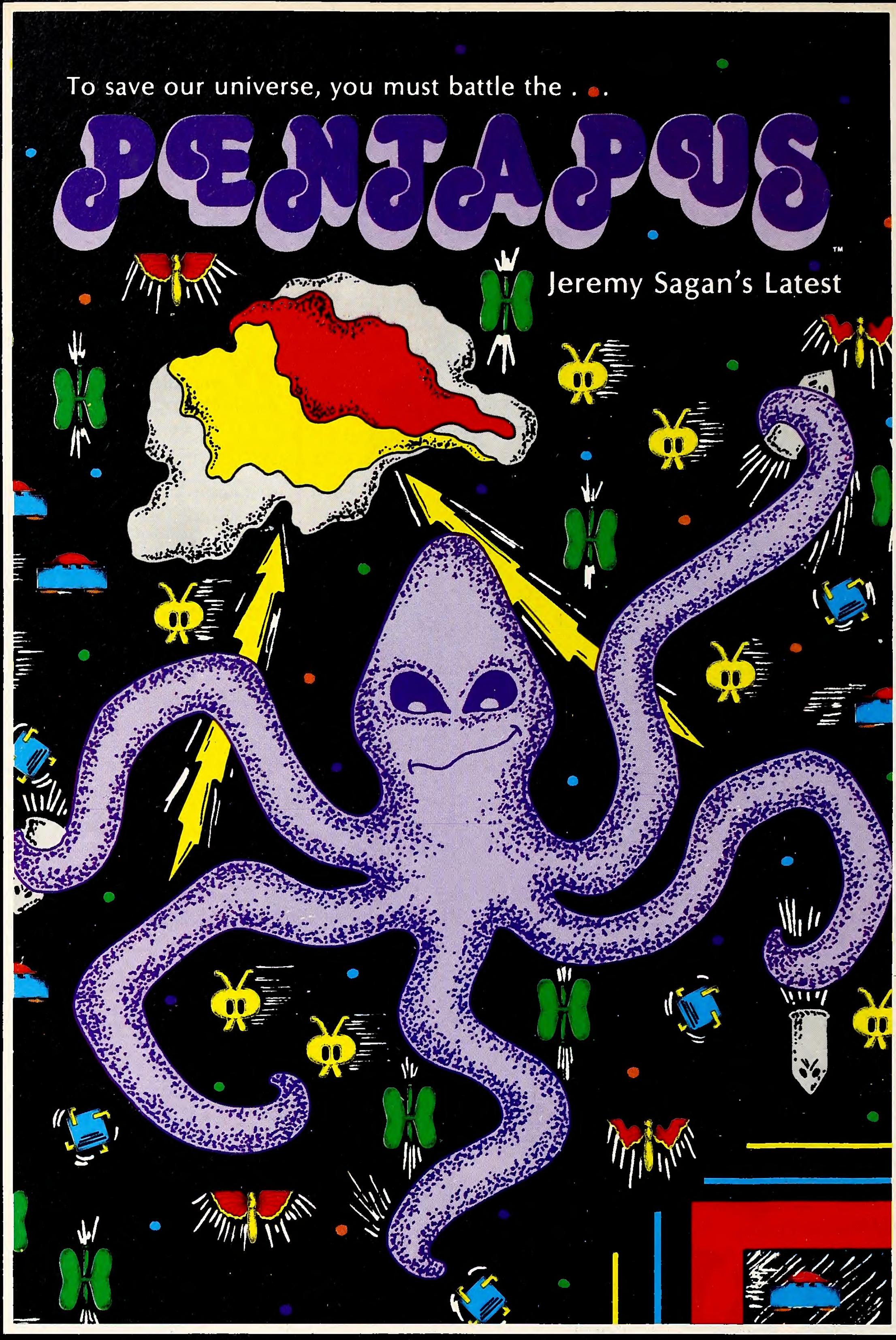

To save our universe, you must battle the . . .
PENTAPUS™
Jeremy Sagan's Latest

Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

☐ Now you can make your Apple truly portable. **Softwarestop** (10975½ Santa Monica Boulevard, Los Angeles, CA 90025; 213-479-0206) manufactures the Teddy, a kit designed to let you rebuild your Apple II into a portable computer. The kit includes an aluminum case with an epoxy/enamel coating. You just remove the motherboard, power supply, and keyboard from the Apple housing and reinstall them in the Teddy. It also has room for two disk drives, a nine-inch monitor, and as many cards as you can fit in the slots. $395; nine-inch green screen, $119.

☐ The newest thing from **Infocom** (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031) is *Enchanter*, the first in a trilogy of fantasy games. The *Zork* coauthors have put together a fantasy environment in which the emphasis is on magic. In order to banish the evil warlock Krill from this world, you'll need to master more than a dozen spells and use them in your struggle to restore peace. A new element in *Enchanter* is the passing of time; as days go by in the story, you must nourish yourself or your powers will eventually start to fail. $49.95.

☐ *Teacher's Record Book* is designed to keep track of student information, including name, I.D. number, phone number, test and homework scores, and attendance. *Teacher's Record Book* will run teacher-written programs to produce special reports. From **Glow Software Systems** (7001 Amherst Drive, Little Rock, AR 72205; 501-664-9469). $94.95.

☐ **Aguila Corporation** (24 Park Street, Pepperell, MA 01463; 617-433-9502) produces *AE-Typeset*, an enhancement for *Apple Writer* and Epson MX/FX printers. *AE-Typeset* makes it easy to vary print styles, line spacings, and extra characters. An on-line help menu is also provided. $89.95.

☐ *Market Analyst*, from **Anidata** (318 South Black Horse Pike, Blackwood, NJ 08012; 609-228-3034), is a three-part package for the stock-market investor. *Technical Analyst* charts high-low-close bar charts and volume histograms, in addition to calculating and charting technical studies. *Portfolio Manager* keeps track of multiple portfolios, making the holdings available for evaluations, calculations, and appraisals. *News, Views, and Quotes* is the teleprocessing section that gives you access to many remote database services; it stores up to thirty pages of text. *Market Analyst* is written in Pascal for quick response. $495.

☐ **FlipTrack Learning Systems** (Box 711, Glen Ellyn, IL 60137; 312-790-1117) has introduced a training course on the operation of the Apple IIe; the course picks up where the Apple's demonstration disk leaves off. *How To Operate the Apple IIe* includes three audio cassettes that familiarize users with the *System Master*, *Sample Programs*, and *Apple Presents . . . Apple* disks. $49.95. *How To Use WordStar & MailMerge* is a set of four cassettes and a user reference manual. The full *WordStar* course is included, plus a new cassette lesson on how to prepare form letters and mailing lists, insert and adjust boilerplates, print multiple copies, and more. Before exploring the capabilities of *MailMerge*, the FlipTrack cassettes talk the novice through each command of the *WordStar* program. Specialized commands for underscore, boldface, page headings, subscripts, and search and replace are taught through hands-on practice. $65.

☐ **Plain and Simple Software** (9003 Lexington N.E., Albuquerque, NM 87112; 505-293-2448) has released a program for food brokers, called *The Food Broker*. It supports up to twenty-five salespeople, one hundred principals, one thousand customers, and two thousand products. More than two hundred reports provide detailed analysis of each category. Reports include commission reconciliation, product usage, regional sales, and transactions. $750.

☐ Computer Literacy Week will be held September 19–22 at the New York City Hilton and will offer supervisors and other business professionals a chance to become computer-literate. The program will include more than thirty-five sessions that teach the essentials while avoiding jargon and technical terms. For information, contact Susan Jones at **Conference Management** (17 Washington Street, Box 4990, Norwalk, CT 06856; 203-852-0500).

☐ *CP/M Workshop* is a comprehensive learning program that shows novices how to get started with CP/M. This program from **Datascan** (2716 Ocean Park Boulevard, Santa Monica, CA 90405; 213-452-9114) provides a self-paced seminar complete with diagrams, exercises, reviews, demonstrations, hints, and evaluation sessions. The disk and backup come in eight-inch format. $115.

☐ **Riverside Data** (Box 300, Harrods Creek, KY 40027; 502-228-3820) helps you get more work, fun, and information out of your computer,

with the introduction of *PLUMB—Probing the World of Personal Telecommunications*, a newsletter to help computer users explore the services available through modem communications. $20 for five issues.

☐ If the pressure pad in your Apple disk drive gets dirty, you may have to replace it. **Cyber-Tech** (Box 924, Chatsworth, CA 91311) provides you with a kit containing an approved replacement pad and a step-by-step manual, complete with photographs. $5.95.

☐ From **Andent** (1000 North Avenue, Waukegan, IL 60085; 312-223-5077) come several programs, all unlocked and modifiable. *Appointments* lets you manage an appointment book and view appointments on the screen or on a printer. More than seventy-five hundred appointments can be placed on one disk. Programs can be listed and changed as necessary. $75. *Apple Alarm* converts a computer into a sentry that keeps track of intrusion, smoke, motion, fire, moisture, and other on/off sensory inputs. Attached to your floor mat, door switch, fire alarm, or other sensory devices, it will sound an alarm or quietly keep time from the moment it is triggered. $20. *The Coin Collector* is a database program for numismatists. A meeting list lets you sort and select meetings by date and location. The source list gives sources for coins, supplies, and information on trades and liquidations. File Transfer lets you transmit data to other computers by modem. $49. *The Stamp Collector* is a database program for philatelists and works much like *The Coin Collector.* $49.

Dental-Medical Office Data consists of thirteen programs that handle appointments, patient files, phone lists, insurance lists, inventories, checkbooks, and other database functions. $150. For offices that need only computerized insurance, there's *Dental Insurance Form Writer.* It lets you prepare American Dental Association insurance claim forms and then load, edit, and print them as many times as you want. Each disk will accommodate more than one hundred families. $100. *Medical Insurance Form Writer* lets you prepare health insurance claim forms on your Apple. A master form can be created for each patient or family and then saved for later use. Each disk holds forms for up to one hundred families. $100. *Histogram Plot* is a statistics package for the researcher, student, or businessperson who needs a quick and simple statistical data system. $39. *The Hypnosis Disk* is an aid to self-directed relaxation, behavior modification, and trance induction. $20.

Librarian List is a database system for libraries of all sizes. Nine programs handle collection, loan, and staff information in multiple formats. $150. *Professional Disk* includes several programs. *Alcoholic Test* tests for traits of alcoholism. *Heart Attacks* can test your chances for heart problems. *Interest Print* helps you compute and bill interest on your accounts due. *Label Maker* lets you print any number of labels in any configuration. $20. *The Prescription Form Writer* prepares multiple preprinted prescription blanks for professionals. $20. *The Coupon Organizer* helps organize coupons and also will handle qualifiers, trades, mail coupons, clearing-houses, and expiration dates. $39. *The Guide* is a 206-page book with hundreds of ideas, plans, and illustrations of equipment that can be made for the dentist's office. $19.95. *The Dental Computer Newsletter* is a monthly newsletter for dentists, physicians, and office management people who have interests in office computers. Each issue contains information on computers for the office, software and hardware reviews, and practical tips on computerizing your office and training your staff. Included is an information hot line. $15 per year.

Museum Collector Catalog is a database system for museums, professional and amateur anthropologists, naturalists, and collectors. It holds catalog and access numbers, category descriptions, values, and more. Included is a text editor for writing labels, letters, reports, and papers. $150. *Encephalon* is a neurologic patient simulator. The program interactively simulates neurologic patients by means of a hi-res display. It lets medical students practice examination and diagnosis on simulations constructed from previous findings. Requires Integer Basic. $39. *Response Time* checks your reaction/response time and levels of intoxication. It can be used to test the sobriety of friends at parties, customers at bars, and patients after anesthesia. $39. *Recall List* is a database program that keeps track of thousands of patients' or clients' records. Reports and mailing labels can be generated. $39. *The Game Disk* includes six games from arcade action to thinking games. $20.

☐ Personal-computer product vendors are reserving more than two hundred exhibits at the Seattle Center Exhibition Hall for Compufair Seattle, to be held September 16–18. Vendors will display hardware, software, and services currently available for a wide range of applications. Seminars will be given on computer use by children, computer purchasing tips, and the future of personal computers. For information, contact **Compufair** (Box 45218, Seattle, WA 98105; 206-633-FAIR). Admission is $5.

☐ **Technical Education Research Centers** (44 Brattle Street, Cambridge, MA 02138; 617-547-0430) has two resource packages and a newsletter. *Micro Info* contains three references: *The Software Finder* describes more than twenty-five hundred school and college oriented educational software products on more than sixty subjects; *The Resource Handbook* is a compendium of hardware manufacturers, educational software producers, databases, bibliographies, and more; *Microcomputers in Education: An Introduction* is a planning tool for implementing microcomputers in educational programs. $28. *Soft Info* offers more than one hundred software evaluations, all written by teachers. $25. Both *Micro Info* and *Soft Info* are available for a package price of $47.70. *Hands On!* is a quarterly newsletter on developments in the world of educational computing. $10 per year.

☐ *Ana-List* is a program from **Synoptic Software** (57 Reservoir Lane, Chestnut Hill, MA 02167; 617-277-0778) that helps you work with lists. It can take a table of information and quickly rearrange, change, and print the information in a way that makes sense to you. You can build lists of up to eight hundred items—eight columns with one hundred rows. If you have 64K, *Ana-List* will handle up to twenty-seven hundred items. The program can work with tables from one to forty-six columns wide. $150.

☐ *Computer Games Guide* is a monthly collection of brief game reviews from **Arcadeo** (6648 North Newgard Avenue, Chicago, IL 60626; 312-761-1814). Reviews cover mostly Atari games, but a few Apple games are also included. $18 per year.

☐ Cheers! **Homemaker Software** (683 Towle Way, Palo Alto, CA 94306; 415-856-7467) has announced the publication of *Drinks on a Disk*, an automated home bar guide that contains more than one hundred ten recipes for drinks. The program lets you choose from among thirty-two categories of drinks, and it has information on equipping and stocking a bar, measurements, and types of glassware. $14.95.

☐ **MicroMotion** (12077 Wilshire Boulevard, Suite 506, Los Angeles, CA 90025; 213-821-4340) has released *Forth-79 Version 2*. The system includes a screen editor, macro assembler, string package, thirty-two-bit integer arithmetic, and a manual. $139.95.

☐ All you do is complete a questionnaire about your lifestyle. The information is fed to the Apple to produce a report assessing your health prognosis and offering advice on how to reduce health risks outlined in the report. The program is *Wellness Check*, and it includes two booklets, *The Way to Wellness* and *The Way to Wellness for Teens*. From **Rhode Island Department of Health** (75 Davis Street, Providence, RI 02908; 401-277-6957). $250.

☐ The Micro/Scan version of the *Merrill Lynch Equity Research Database* is now available; it includes fourteen hundred companies and fifty-two variables on two disks each month. The system, from **Isys** (Box 214, Cambridge, MA 02238; 617-491-6221), downloads fourteen hundred daily stock prices directly onto the Micro/Scan disks, with all variables automatically recalculated. To receive the prices, you need a Hayes Smartmodem; other modems won't work. A full year's subscription includes twelve months of data disks, unlimited access to all data at all times, and overnight air express delivery of disks. $6,250. You can test the database with a trial subscription package for $35.

☐ **N-Squared Computing** (5318 Forest Ridge Road, Silverton, OR 97381; 503-873-5906) has come out with an enhanced version of its *Nutritionist*, an interactive-graphics diet-analysis program. It's a tool for pointing out deficiencies and excesses in diet, identifying their sources, and determining foods for a balanced diet. It creates food lists for special, multiple-requirement diets automatically. $145.

☐ The Polaroid Palette computer-image recorder from **Polaroid** (575 Technology Square, Cambridge, MA 02139; 617-577-2000) transfers color or black-and-white graphics from your screen to Polaroid 35mm Autoprocess transparency film and Polacolor ER instant-print film. The system connects to the computer via a video line and RS-232C communication line. It can be used with several existing graphics software packages and is supplied with software that lets you change or add colors on the film. The package includes a 35mm camera back and adapter plate, as well as Polaroid 35mm Autoprocess transparency system hardware. $1,300.

☐ **Wordmovers** (15818 Hawthorne Boulevard, Lawndale, CA 90260; 213-542-7351) has entered the field of communications with the introduction of *Mite*, a powerful program that allows a CP/M-based machine to be turned into a powerful, intelligent data terminal. It also lets you use the computer as a TWX or Telex terminal. This menu-driven program supports many different protocols and provides full modem control with auto log-on if required. Files can be transferred with error-checking. CP/M is required. $150.

☐ The latest from **GolfSoft** (10333 Balsam Lane, Eden Prairie, MN 55344; 612-941-2172) is *Handicapper*, a professional golf handicap-management system that provides handicaps that conform to those of the United States Golf Association. It's menu-driven and contains sixteen modules. As many as three hundred seventy-five handicaps can be created on a data disk for either nine or eighteen hole rounds. Handicaps may be set between one and fifty-four. A printer helps. $175.

☐ *MicroTerm* from **Micro Systems Software** (4301-18 Oak Circle, Boca Raton, FL 33431; 305-983-3390) is a smart terminal program that operates at 1200 baud and in some cases up to 9600 baud. It lets you continue receiving data while you're in menu mode; you can adjust video width, turn on the printer, open the buffer, and then return to terminal mode without missing any data. $79.95.

☐ The Olivetti Praxis 30 or Praxis 35 typewriters can be connected to your Apple to function as a daisy-wheel printer. Type & Print from **Applied Creative Technology** (2723 Avenue E East, Suite 717, Arlington, TX 76011; 817-261-6905, 800-433-5373) features a standard parallel interface and connects the Apple to the typewriter. Type & Print is $179.

☐ *Decision Analyst* is a program designed to assist managers in analyzing complex problems in which there are many alternatives and criteria. The program structures the decision-making process into logical steps. It takes you through eight menu sections, including problem definition, the establishment and evaluation of necessary and desired criteria, the calculation of values, the defining of alternatives, and other parts of decision making. Final reports are printed. Requires CP/M, 52K, an eighty-column screen, and eighty-column printer. From **Executive Software** (2 North State Street, Dover, DE 19901; 705-722-3373). $139.

☐ The new version of *Computer Golf* from **Avant-Garde Creations** (Box 30160, Eugene, OR 97403; 503-345-3043) is *Hi-Res Computer Golf II, Pro Courses Series.* It has better graphics, better sound, and many new features to make the game more realistic. $29.95. *Paint Master Scene Utility* teaches and guides you, as well as providing routines for scene creation. $34.95.

☐ *Best Crop* is a farming program from **Agricultural Software Systems** (Suite 109, 1216 Dawson Road, Albany, GA 31707; 912-431-1113) that consists of six interlocking, menu-driven modules. The program lets the farmer record and analyze soil fertility, view histories of farms and fields, and measure how well any farm or field performs. Included is a section that lets the farmer enter the results of soil analysis. For any crop, *Best Crop* will recommend the amount of fertilizer that should be applied to the field. $695.

☐ With *The Creator*, from **The Professor** (Box 301, Swanton, VT 05488; 514-747-9130), you can create multiple-choice questionnaires in any language you choose. A text-entry system lets you enter and edit questions; a scoring system keeps track of the respondent's progress and offers detailed results to the supervisor. *The Creator* comes with character sets for letters with accents in many foreign languages and includes upper and lower case capabilities without hardware. $399.95.

☐ The Princeton HX-12 RGB color monitor can now be used with the Apple if you have the RGB-80 card from **Princeton Graphic Systems** (1101-I State Road, Princeton, NJ 08540; 609-683-1660). In addition to providing new video modes, the RGB-80 card supplies the IIe with eighty-column text capability. You can select from among four colors for text; medium and lo-res modes support sixteen colors, while hi-res supports six. All three modes give you the option to mix text and graphics. The RGB-80 card is $185.

☐ *Business Cycle Analysis*, from **Instant Software** (Route 101 and Elm Street, Peterborough, NH 03458; 603-924-9471) helps in making planning decisions about inventory control, investments, personnel increases, and credit extensions. The program also studies business cycles, and calculates twelve-month moving averages and pressure curves, in addition to printing out graphics of business cycles. $59.95.

☐ **Intrans** (2005 Texas Avenue, Shreveport, LA 71103; 318-221-0200) has released *PROMPT* (professional office management and patient tracking), a physician office-management system designed to help physicians and their staffs maintain patient records and billing files. *PROMPT* also provides physicians with the AMA CPT-4 medical procedure file and Health Care Financing Administration's ICD-9-CM diagnosis file. $2,500 to $5,000.

☐ **Phoenix Software** (64 Lake Zurich Drive, Lake Zurich, IL 60047; 312-438-4850) has introduced *Invoice File*, the first in a series of business templates designed to be used with Stoneware's *DB Master*. *Invoice File* includes formats that provide reports sorted by a number of cross-references. Instructions enable you to customize, design, and generate reports in your own format. $89.95.

☐ **Personal Computer Products** (1400 Coleman Avenue, Suite C-18, Santa Clara, CA 95050; 408-988-0164) has released the *File Transfer* program, which allows you to transfer files from an Apple to an IBM pc or XT. Included in the product is a communications program for both systems, as well as an adapter that allows the two systems to connect. The program contains several utilities that assist in program conversion and

ZERO TO MULTIPLAN™ IN 5.2 MINUTES.

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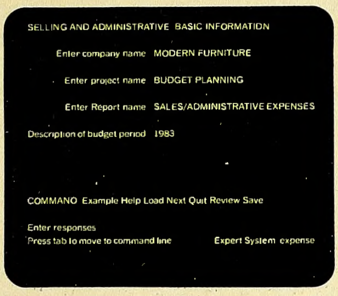
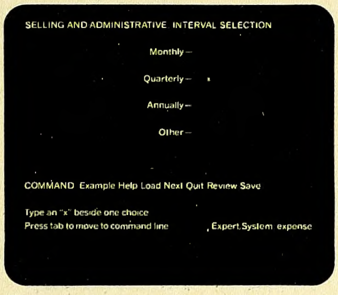


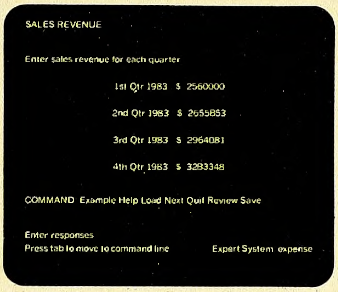
Gentlemen, start your computers.

Time: 0



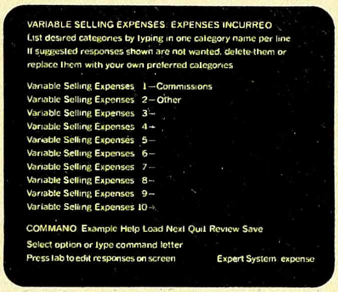
Select budget intervals.

Time: 0.5



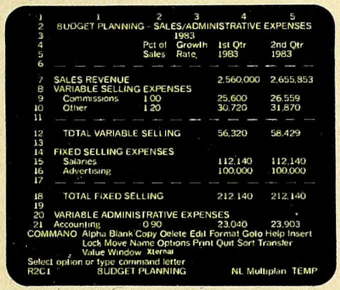
Enter sales revenue.

Time: 1.0



Enter selling expenses.

Time: 1.5



Your sales budget on the Multiplan electronic worksheet-in record time.

Time: 5.2

First, Microsoft created the Multiplan interactive electronic worksheet, to help you analyze your business problems and explore possible solutions. Without asking you to become a computer expert.

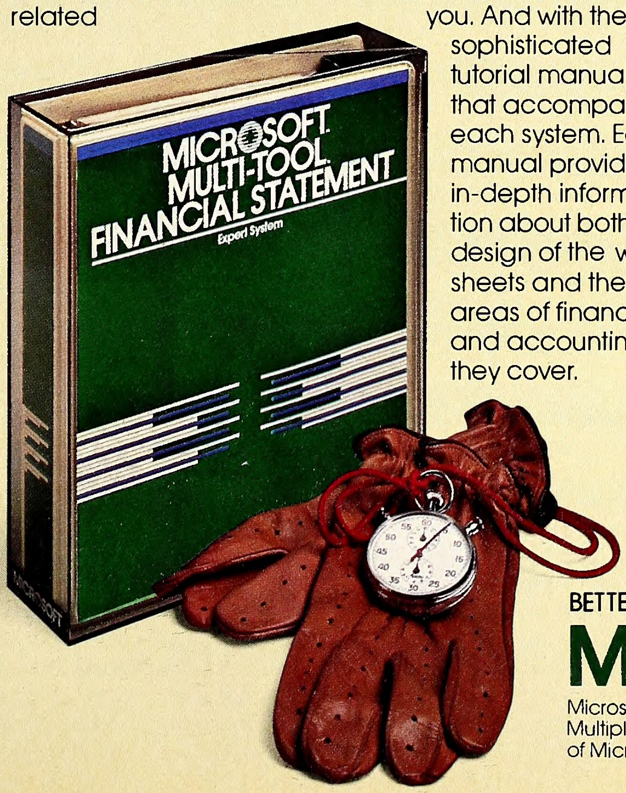
Now we've added the Multi-Tool™ budget and financial expert systems. They can help design and build financial or accounting worksheets tailored to your specific needs. In minutes.

You won't have to worry about developing formulas or formatting screens to build your Multiplan worksheets. Because the expert systems literally do it for you.

For example, the Multi-Tool Budget expert system creates seven interrelated Multiplan worksheets for a total budget planning and control environment.

What's more, each system is developed by experts: business professionals and leading authorities in finance and accounting.

You'll benefit from their knowledge immediately, through the powerful worksheets each Multi-Tool expert system builds for you. And with the sophisticated tutorial manuals that accompany each system. Each manual provides in-depth information about both the design of the worksheets and the areas of finance and accounting they cover.



The result: a tailored electronic worksheet that helps you make high quality decisions.

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THE MULTI-TOOL EXPERT SYSTEMS. A POWERFUL ADDITION TO THE MULTIPLAN ELECTRONIC WORKSHEET.

Available now:
The Multi-Tool Budget expert system.
The Multi-Tool Financial Statement expert system.

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can aid in preparing files to be edited. The program supports the transfer of random text, data, and binary files; high-level language programs; *VisiCalc* data; word processor files, and more. It supports baud rates from 110 to 9600. $94.95.

☐ **Celestial Software** (3010 Warrington Avenue, Lakeland, FL 33803; 813-686-3311) is packaging navigation programs, which include great-circle sailing, rhumb-line sailing, dead reckoning, latitude by noon sight, longitude by time sight, star and plant identification, and sight reduction. These seven programs are available on one disk or cassette tape. Cassette for Apple II, $19.95; disk for II Plus, $24.95.

☐ *Classroom Grade Manager* from **Hayden Software** (600 Suffolk Street, Lowell, MA 01853; 617-937-0200) aids the teacher in storing, computing, and retrieving student grades. From entered data, the program automatically constructs a grading scale, and it graphs and displays grade distribution. *CGM* can handle eighteen grades (scores) per term and up to fifty students per class. It can process an unlimited number of classes for either the quarter or semester system. There are also reports for listing and averaging current and semester grades, for ranking each class, and for analyzing exam statistics over a period of years. $149.95.

☐ **USUS** (Box 1148, La Jolla, CA 92038), the UCSD Pascal System User's Society, has formed a special-interest group for users of Modula-2. Members of the group share experiences with others using the language or developing applications in it. For USUS members, the membership is free; society membership is $25 for nonmembers and $500 for institutions. For more information, contact David Ramsey at Corvus Systems, (408) 946-7700, ext. 267.

☐ **Orrington Economics** (Box 3756, Arlington, VA 22203; 703-527-5990) has come up with *Micromarkets II*, a database for market researchers and sales managers. This updated version of Orrington's *Micromarkets* contains thirty-four demographic and retail sales variables for each state and for each of the fifty largest metropolitan areas. Twelve variables are given for each of the two hundred largest metropolitan areas. The program stores data in DIF format, making it compatible with *VisiCalc* and other programs that generate similar data. $99.

☐ Two packages are available from **Microsoft** (10700 Northup Way, Bellevue, WA 98004; 206-828-8080) to help in using the company's popular *Multiplan*. The two systems create finance and accounting worksheets in *Multiplan* for business managers and professionals. After prompting you for pertinent information, the programs automatically enter formulas and format the worksheet. Both require CP/M. The *MultiTool Budget* system is for retailers and manufacturers who require an operating budget planning and control system. $150. The *MultiTool Financial Statement* system is for managers and people in the financial services industries such as stockbrokers, investment analysts, or management consultants. $100.

☐ More computer furniture! **Accent Computer Furniture** (7587 Clyo Road, Dayton, OH 45459; 513-435-0090) has a line of hardwood-veneered furniture designed for the home and office. Finishes include oak, teak, rosewood, and walnut. Worktables are available in thirty-six-inch and forty-eight-inch models and feature detachable monitor and peripheral shelves. Forty-eight-inch, $340; thirty-six-inch, $300.

☐ A new video-display card is available from **Videx** (897 N.W. Grant Avenue, Corvallis, OR 98330; 503-758-0521). The UltraTerm gives you an 8-by-12 dot-character dot-matrix with stable, flicker-free display. Nine software-selectable video-display formats allow as many as 4,096 characters to be displayed. Display modes range from forty to one hundred sixty columns and from twenty-four to forty-eight lines. From software, you can select between bright and dim, standard and alternate character sets, and normal and inverse characters. $379.

☐ **Salus Software** (2 Worcester Street, Belmont, MA 02178; 617-484-6154) publishes *Loan Analysis III*, a menu-driven loan-amortization program for the Apple III. The program is designed for use in real-estate offices or loan offices of banks and finance companies. An amortization schedule can be printed for the entire loan or any consecutive set of years during the loan. It can handle fiscal years other than calendar years and loan amounts under $1 million. $39.95.

☐ **Synetix Systems** (15050 N.E. Ninety-fifth Street, Redmond, WA 98052; 800-426-7412) produces a plug-in board that emulates a disk drive but executes programs up to ten times faster. The Flashcard is available in 147K and 294K versions and is compatible with most DOS, CP/M, and Pascal programs that aren't copy-protected. You just copy your program disk onto the Flashcard, which reacts as a disk drive but is faster and quieter. 147K version, $395; 294K, $695. CP/M and Pascal interface software disks are offered for $50 each.

☐ *Graphicmaster* is a set of five modules from **Tid Bit Software** (Box 40368, Santa Barbara, CA 93103; 805-969-2187) that combine to let you produce professional graphics. The *Fontcaster* makes characters in resolution of up to 24 by 24 pixels with upper and lower case letters in the same set. The *Patternmaster* presents a vivid display of unlimited patterns and colors, letting you discover the intricacies of Apple hi-res color. The *Bitmap Wizard* gives you a set of five differently shaped viewports that let you cruise the hi-res screen and save sequences of pictures to disk. The *Window King* lets you define hi-res areas to be saved on disk for later use. Finally, there's a module that lets you use all the elements of the other four modules. It's all nonprotected, so you can see what makes it work. $79.95.

☐ **Micro Program Designs** (5440 Crestline Road, Wilmington, DE 19808; 302-738-3798) has introduced *Math Alert!*, a refresher course in arithmetic basics for adults. Parents and teachers may also use it as a companion tutorial for younger people. Numbers, addition, subtraction, multiplication, division, fractions, decimals, and percentages are covered. Applications include checkbook balancing, discounts, payroll, and depreciation. $19.50.

☐ The Microcomputer Work Station from **Misco** (404 Timber Lane, Marlboro, NJ 07746; 201-780-9299) consists of components that can be used individually or together. The components are the computer stand, $79.95; printer stand, $79.95; connecting leaf, $39.95; universal compartment, $24.95; and paper basket, $29.95. All five as a unit retail for $224.75.

☐ The Microbuffer II from **Practical Peripherals** (31245 La Baya Drive, Westlake Village, CA 91362; 213-991-8200) is now available in both serial and parallel versions. 16K, $259; 32K, $299.

☐ A quick system for getting rid of static dust on CRT screens for up to two months per treatment is available from **Chope-Stevens Paper** (1800 Eighteenth Street, Detroit, MI 48216; 313-237-0300). The Copysource Anti-Stat Clean Kit contains fifty pads treated with a specially formulated solution. $12.95.

☐ **Southwestern Data Systems** (Box 582, Santee, CA 92071; 619-562-3221) is combining its Professional series with popular communications services. Each purchase of *ASCII Express: The Professional*, *Z-Term: The Professional*, and *P-Term: The Professional* now includes offers for the following services: BRS/After Dark, CompuServe, Delphi, NewsNet, and the Source.

☐ **Applause** (1749 Harmil Way, San Jose, CA 95125; 408-723-3133) makes the Applerest, which attaches to the front of your Apple, providing a place to rest the heels of your hands while your fingers tap away at the keyboard. $19.95.

☐ *Managerial Finance in Action* is an interactive, computer-assisted instruction course in financial management from **International Management Institute** (34 Maple Street, Summit, NJ 07901; 201-522-1213). Designed to handle up to three people concurrently, the course consists of five audio tapes, ten disks, and documentation. Subjects include finance and accounting language, interpreting financial reports and statements, communicating with financial specialists, measuring business performance, and using the Apple as a financial tool. $375.

☐ *Automated Telephone Office Management* (Marketalk News, June 1983), the telephone management system that helps managers keep track of who's calling where and when, is available from **ATOM** (25 Roxbury Road, Scarsdale, NY 10583; 914-472-0038). $4,500.

☐ Three software utilities for the Soundchaser music system are available from **Passport Designs** (116 North Cabrillo Highway, Half Moon Bay, CA 94019; 415-726-0280). *Traksplayer* lets you produce albums by creating four-track musical selections, then play them in any order, repeated as many times as you want. You just load the tracks into *Traksplayer*, organize the playback, and an album is produced. This utility also takes advantage of improved DOS and compressed file formats. $75. *Tunings* is a collection of different four-track tuning files for the Soundchaser keyboard. It allows you to experiment with a variety of tunings for exotic instruments. Several unusual tunings are included. $50.

Finally, *4-Track Editor* lets you compose with the computer or work from a written score. The composition can then be edited and compiled in a Soundchaser file and played back to hear the results. The program can be used to eliminate wrong notes, add new notes, rewrite parts or the whole piece, and smooth out rhythmic irregularities. It can even generate a printout of the composition in a format for fast editing. $195.

☐ The latest addition to the Ghost series of word processing programs from **Einstein Corporation** (11340 West Olympic Boulevard, Los Angeles, CA 90064; 213-477-6733) is *GhostSpeller*. The program not only detects words commonly misspelled, but it also finds words that should be capitalized or hyphenated. It scans the text while the text is on the screen. When it finds misspelled words, *GhostSpeller* suggests correct alternate spellings. You can add words, such as client names and addresses, to increase the program's vocabulary. $149.95. Einstein also has announced *MemoryTrainer*, a program designed to help you improve your ability to remember faces, dates, phone numbers, lists, quotations, and other information. The disk includes five different lessons and an interactive game to challenge you. $89.95. The *Einstein Compiler* translates Applesoft programs into machine language, making them run as much as twenty times faster. $129.

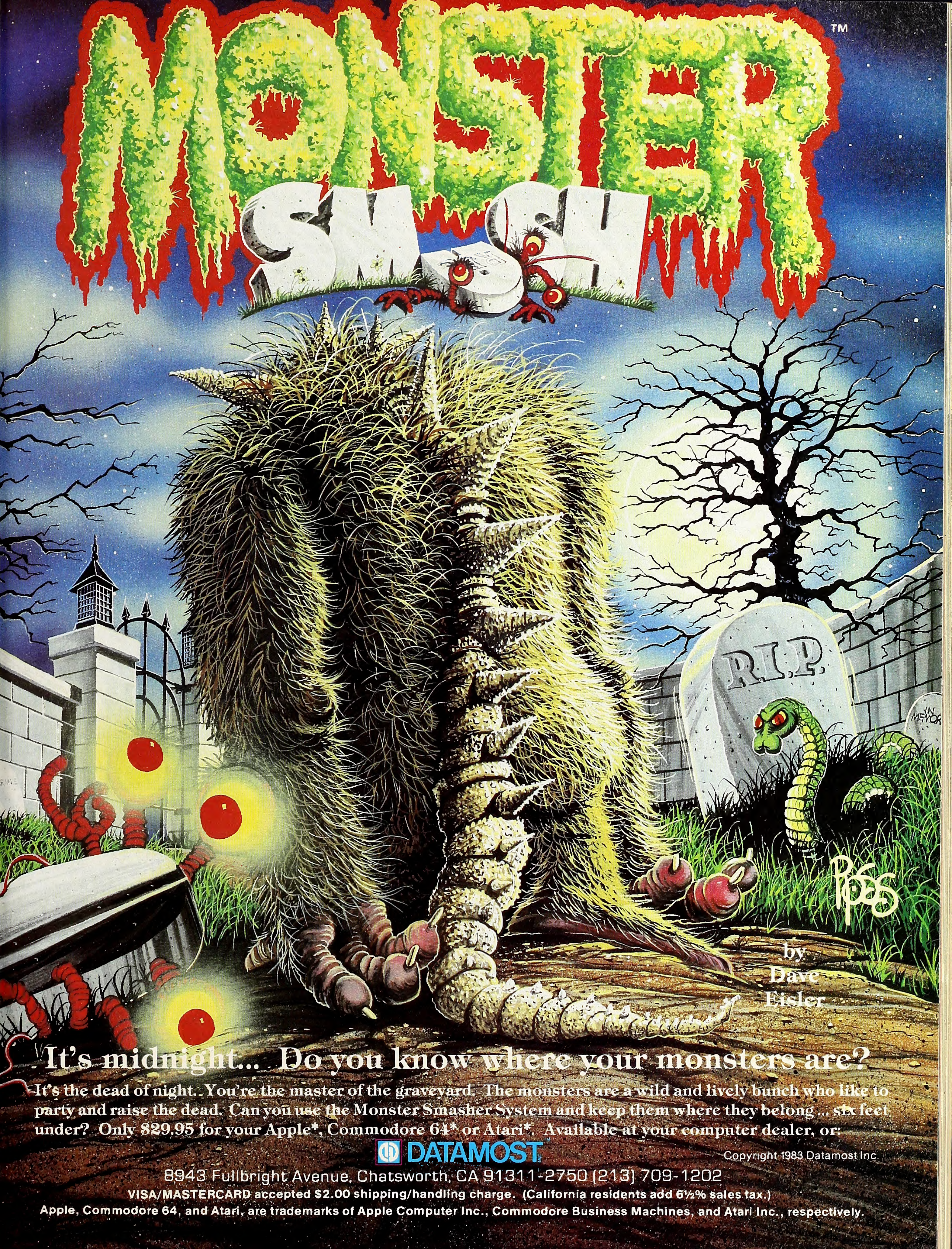
☐ *TermExec* is a modem terminal program from **Exec Software** (201 Waltham Street, Lexington, MA 02173; 617-862-3170) that lets you capture and send files in interactive or unattended modes. A full-screen editor and backscrolling feature are included. Lateral scrolling handles text that's more than forty characters wide, and menus make the program simple to use. $49.95.

☐ DDS Net, the disk-drive sharing network from **Kramer and Kramer Software** (Harvest Computer, 118 Magazine Street, Cambridge, MA 02139; 617-277-3817), lets up to five Apples share the disk drives of a central Apple, eliminating the need for extra disk drives. DDS Net includes connecting cables, software, and a matcher connector. $100 plus $10 per remote computer.

☐ From **Micro-Sparc** (Box 325, Lincoln, MA 01773; 617-259-9710) is *Mission: Escape!*, an arcade game that uses 64K of memory to give you twelve levels of play. You pilot your shuttle through asteroids and meteors to rescue the Tweenies from their planet gone volcano-crazy. Requires 64K. $29.95.

☐ **Dow Jones** (22 Cortlandt Street, New York, NY 10007; 212-285-5466) has announced three new databases for Dow Jones News/Retrieval Service subscribers. The *Forbes Directory* ranks the 500 largest U.S. corporations by sales, profits, assets, and market value. It also includes analyses of forty-six major industries ranked by profitability and prospective growth. *Comp-U-Store* is a shop-at-home service featuring more than fifty thousand discounted brand-name products, all of which can be ordered from and shipped to the subscriber's home or office. The *Directory of Symbols* is a constantly updated compilation of symbols and company names for all firms on the New York, American, Pacific, Midwest, and the over-the-counter stock exchanges. It also includes information on mutual funds, corporate and foreign bonds, and treasury notes and bonds.

☐ New from **Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-843-0550): *Secrets of Better Basic* lays down some sophisticated programming tricks and techniques used by professional software authors for writing faster and more effective Basic programs. It has appendixes that include the ASCII codes, numerical systems and conversions, sample disk and memory tests, and some useful software. $14.95. *Microcomputers Can Be Kidstuff* lets young people learn how to use microcomputers productively. Descriptions and explanations of hardware and software prepare the reader to begin learning Basic and Pilot languages. Information on writing and saving programs and using commercial software is also given. $8.95. *Using Microcomputers in Business* is a guide for the perplexed. It describes the advantages and disadvantages of computerization and lets the potential user make good purchasing decisions. $12.95. *Pascal Programs for Business* is a collection of twenty-eight powerful business programs. The book begins with simple statistical analysis programs and moves to more ambitious applications. Programs include a spreadsheet and a text-formatting program that makes a word processor out of Pascal's text editor. There are also programs for bar charts, merging mailing lists with text to produce personalized letters, routines for sorting data, and more. $15.95.



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Apple, Commodore 64, and Atari, are trademarks of Apple Computer Inc., Commodore Business Machines, and Atari Inc., respectively.

☐ To help you meet the needs that result from having a growing library of disks, **The D.P. Consultant** (Box 1174, Plano, TX 75074; 214-596-0594) is manufacturing Labelware. The product consists of 124 labels: fifty-six rectangular labels that tell you what's on the disk, sixty universal symbols advising on disk care, and eight blank disk labels for versatile use. $3.

☐ **Transtar** (Box C-96975, Bellevue, WA 98009; 206-454-9250) has announced its Model 120 daisy-wheel printer. It's compatible with word processors that use Diablo routines for boldface, underscore, superscript, and subscript printing. You can select spacing to be ten, twelve, or fifteen characters per inch. The Model 120 includes the automatic paper-loading system of the Model 130. A bidirectional forms tractor is an option. $599.

☐ **Alphacom** (2323 South Bascom Avenue, Campbell, CA 95008; 408-559-8000) has released a low-cost eighty-column printer with graphics capabilities. The Alphacom 81 prints eighty characters per second on thermal paper and can handle bit-mapped graphics. $169.95. Alphacom has reduced the price of the Alphacom 42 forty-column printer to $119.95.

☐ **Systems Enhancement Engineering** (Box 40215, Indianapolis, IN 46240; 317-844-8817) markets a basket to hold the paper that comes out of your printer. The unit is designed to be used with printers placed on any table or desk; no printer stand is required. Two sizes are available. Twelve-inch, $22.50; eighteen-inch, $24.50.

☐ **Luxor** (2245 Delany Road, Waukegan, IL 60085; 312-244-1800) produces three computer workstations that are part of its Endura Computer Line. The tables come with four-inch casters—two with brakes. A cord-management rack and a three-outlet fifteen-foot power cord are included. The Model LE-MS includes a data-entry station. $80. Model LE-MST has a raised monitor platform. $118. Model LE-MSS features a pullout shelf. $118.

☐ The **San Diego Computer Society** (Box 81537, San Diego, CA 92138; 619-565-8720) will hold its Fourth Annual San Diego Computer Fair on November 5 and 6 at the Scottish Rite Center in Mission Valley. The fair will feature short technical sessions, programming and computer-games contests, door prizes, commercial displays, and displays for computer user groups. Registration, $5; banquet fee, $12.

☐ More than fifty hardware and software vendors specializing in agricultural computer use will be on hand to exhibit and give presentations at the Computers for Farm and Family seminar and trade show, August 25–28, at the Vo-Tec Building on the University of Minnesota, Saint Paul, campus. Sponsored by **University of Minnesota** (Office of Special Programs, 405 Coffey Hall, 1420 Eckles Avenue, Saint Paul, MN 55108; 612-373-0725). $15.

☐ **Verba Gloria** (802 Twelfth Avenue, Suite B, Menomonie, WI 54751; 715-235-2126) makes the Under-Stand for your computer. It's a space-saving monitor stand made of clear acrylic. It holds one or two drives, paddles, or joystick, and can be modified to accommodate a fan. $71.95.

☐ **Northeast Expositions** (824 Boylston Street, Chestnut Hill, MA 02167; 617-739-2000, 800-841-7000) has announced several shows. CP/M '83 East will be held September 29–October 1 at Boston's Hynes Auditorium. Admission, $10 per day, $25 for a three-day ticket. The Second Annual Twin Cities Computer Show will be held September 15–18 at the Minneapolis Auditorium. Hours are from 10:30 a.m. to 5:30 p.m. Adults, $5; children, $3. The Second Annual Rocky Mountain Computer Show will take place September 22–24 at the Denver Merchandise Mart. Hours are 10:30 a.m. to 5:30 p.m. Adults, $5; children, $3. The Fifth Annual Northeast Computer Show will be held November 10–12 at Hynes Auditorium in Boston. It's open from 10:30 a.m. to 5:30 p.m. $7.50.

☐ The Genius Musician Board by **Innova Computer Industry** (First floor, Suite 1, Alley 2, Lane 929 Min Sheng East Road, Taipei, Taiwan) lets you create, play, and store music. Included in the package are keyboard coding labels and two mini stereo speakers with audio cables. $149.

☐ **Link Systems** (1640 Nineteenth Street, Santa Monica, CA 90404; 213-453-1851) lets shoppers try before they buy. With a small deposit, anyone can take home a special edition of *DataFax* and a manual for a free, seven-day trial.

☐ **Management Software** (Box 555, Tenafly, NJ 07670; 201-569-2592) has announced the availability of two business programs. *Formula Coster* is for baking, food-processing, and chemical-processing industries. It helps keep product costs and prices current when ingredient prices change. $159.50. For restaurants, caterers, and schools, *Recipe Coster* will determine the cost and price of individual recipes or complete menus from ingredients kept on file. $189.50. Both programs offer fast sorts and searches, full scrolling through ingredient files, automatic unit-of-measure conversion, unlimited subformula/recipe levels, and complete reporting capabilities.

☐ The M-80E video card from **Amdek** (2201 Lively Boulevard, Elk Grove Village, IL 60007; 312-364-1180) is specifically designed for the IIe, providing eighty-column text display and a wide selection of new color modes. The card interfaces the IIe with an NTSC or RGB monitor and is fully compatible with the Apple eighty-column card. You can have lo-res and hi-res graphics mixed with either forty-column or eighty-column text and sixteen-color foreground or background in lo-res, medium-res, and hi-res. $195.

☐ **Excalibur Technologies** (800 Rio Grande Boulevard N.W., 21 Mercado, Albuquerque, NM 87104; 505-242-3333) offers a twelve-page brochure, *A Guided Tour of Savvy*, which gives details in nontechnical language on the capabilities of *Savvy*. The brochure is aimed at readers interested in *Savvy*'s pattern-recognition feature and its ability to customize applications. It shows how even a beginner can perform simple tasks such as figuring a loan and gives examples of the use of the program's pattern-recognition processor. $1.

☐ **VisiCorp** (2895 Zanker Road, San Jose, CA 95134; 408-946-9000) and **The Forum Corporation** (84 State Street, Boston, MA 02109; 617-523-7300) are offering a series of training seminars aimed at extending the productivity levels of managers and other professionals in large corporations. Named the VisiTraining Program, the seminars feature the VisiSeries software and cover introductory and hands-on training related to the use of personal computers and software as corporate tools.

☐ **Mind Systems** (Box 506, Northampton, MA 01061; 413-586-6463) simulates private plane flight with the introduction of *Airsim-3*. In addition to a standard instrument panel, there is an automatic radio direction finder. You can perform loops, rolls, stalls, and similar maneuvers. The scenery is along the California coast. *Airsim-3* is designed to aid beginning and accomplished pilots. $40.

☐ *Golf League Statistics* manages, analyzes, and prints records for an industrial or school golf league of up to twenty teams and fifty players. Automatic team scheduling, tee-off order, player standings, USGA handicap system, course records by player and course, and equitable stroke adjustment are all maintained. Team and player statistics such as recent and average points, putts, and scores are all tracked. From **Disk Depot** (731 West Colorado Avenue, Colorado Springs, CO 80905; 303-473-7777). $139.95.

☐ **Artworx** (150 North Main Street, Fairport, NY 14450; 716-425-2833) has released *Monkeymath*, an educational program combining an arcade game with a learning program. Children between ages four and nine try to score the most bananas by causing a monkey to smash the correct answer as the problem moves by on a monkey-powered treadmill. $23.95.

☐ *SDM: Screen Data Manager* is a menu-driven database manager that features custom screen-entry formatting and report generation. It includes twenty-one databases with ten reports each. Two disk drives and lower case are supported. **Software Mill** (19 Grist Mill Road, Acton, MA 01720; 617-264-4237). $49.

☐ **Caps Software** (4024 Alto Street, Oceanside, CA 02056; 619-724-0492) produces *Artist Designer II*, a drawing system designed for artists. It lets you produce irregular shapes and curves, as well as shading with random dots and textures. You select from six colors and mixtures by alternating the colors in stripes, zigzags, or dots. The system can re-create stored designs by redrawing them one step at a time. You can do a storyboard of a performance and step through the scenes as though viewing a series of slides. $49.95. *Music Designer II* is a compositional program allowing you to create complex musical textures with three voices. As the computer generates a musical environment, you can make changes that were once possible only on a synthesizer. No formal music training is required, and you don't have to know conventional notation. Requires a three-voice ALF music synthesizer and 64K. $49.95.

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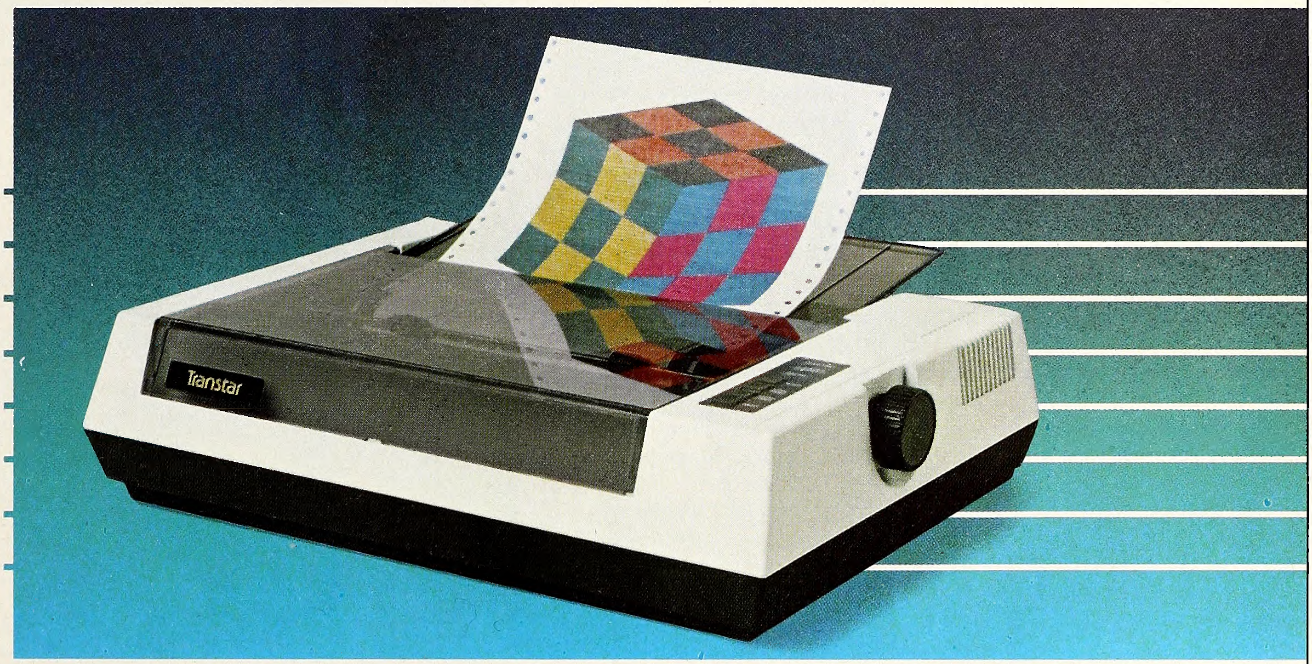

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Robots Come Home

By David Hunter

Robots are a dream, a fantasy, a desire, and a myth.

Today, R2-D2 and C-3P0 exist only in the movies. As yet, no robots have been programmed to embody Asimov's three laws of robotics, and the thinking robot portrayed on the cover of *Softalk*'s August 1981 issue is still a long way off.

And yet when someone engaged in conversation mentions robots, other people in the room turn to listen. Then come the inevitable questions. "You've seen one?" "What does it do?" "Can it talk?" "Did you shake its hand?" "Did it have a hand?"

What is a robot?

Working Robots. To the industrial world, a robot is a reprogrammable multifunctional manipulator designed to move material, parts, tools, or specialized devices in a manufacturing process by means of variable-programmed motions.

By dictionary definition, a robot is "an automatic apparatus or device that performs functions ordinarily ascribed to human beings or operates with what appears to be almost human intelligence."

The majority of present-day robots are a far cry from the popular science-fiction visions of robots that walk, talk, have emotions, experience pain, tell bad jokes, tell lies, get in the way, and come to the rescue.

But now a new breed of mechanical beings is emerging on the scene—personal robots.

What's a personal robot?

To Apple owners a personal robot is a robotic device that is fairly inexpensive and can be used with an Apple II or Apple III in the home by a single individual.

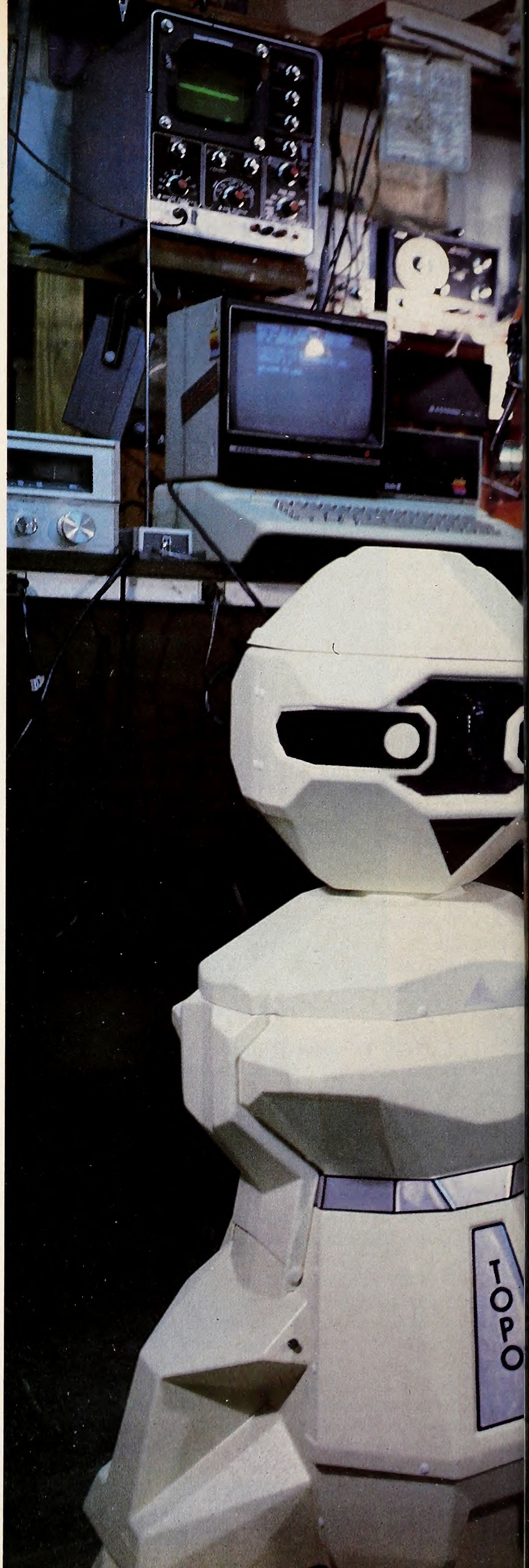
In this context, "fairly inexpensive" means priced at under three thousand dollars. Through its RS-232C interface an Apple is capable of programming many kinds of robotic devices used for manufacturing. Interesting things are going on with the industrial applications of robots controlled by Apples. The real excitement is just beginning, though—robots are coming home.

For years now, hobbyists and truly inspired hackers have experimented with homemade robots—essentially microprocessors on mobile bases—that offered few real functions and hardly any practical applications. The desire of these early robotic pioneers has been to empower the computer to do something—to enable it to interact with the outside world, not just with the mind of its user.

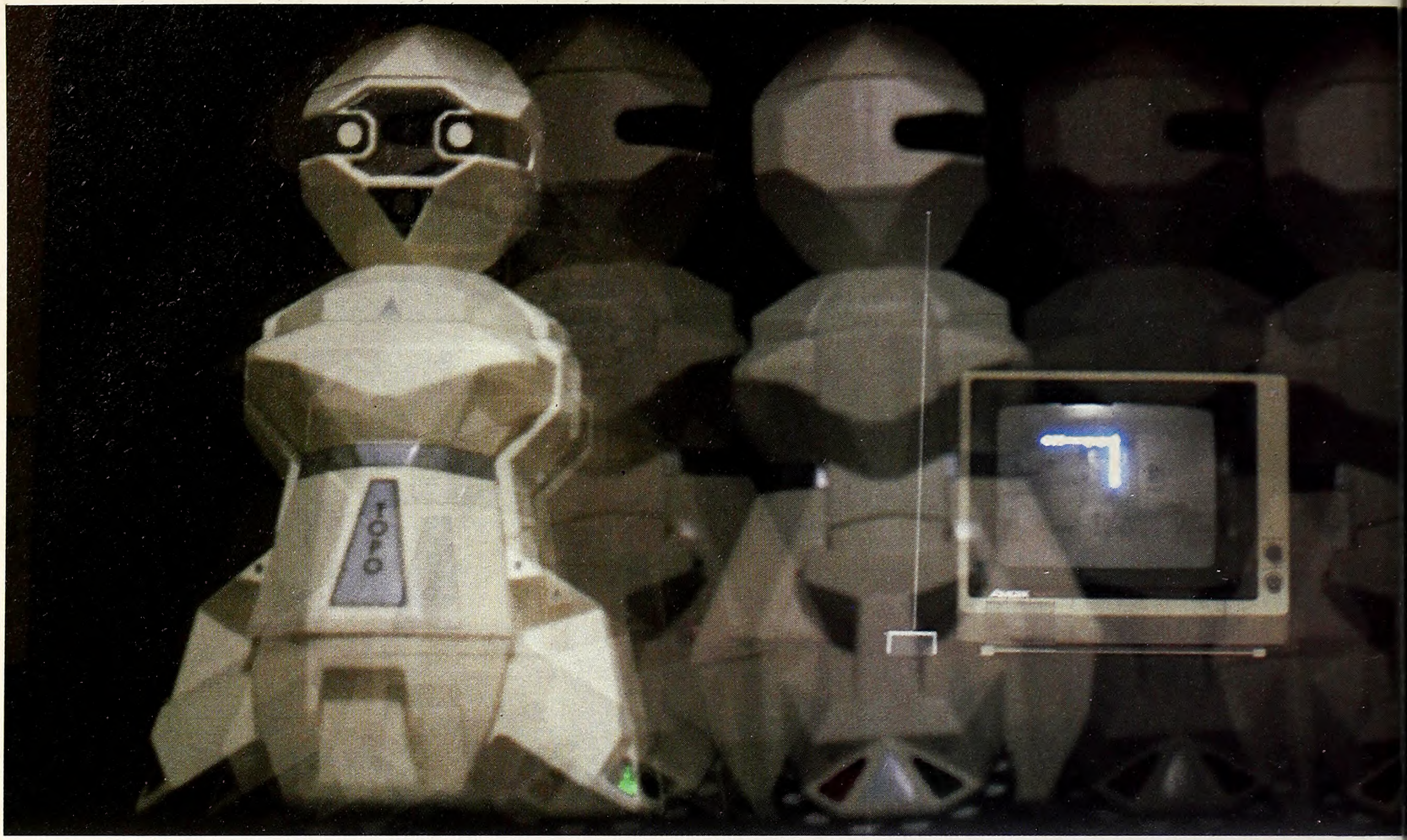
Robotics has been, and for some time will continue to be, an evolving technology. The only way to achieve progress in the field has been to experiment and keep experimenting. This basic fact—that what we have today is only a foretaste of what's to come—is true for both industrial robotics and personal robots.

Two of the robots we'll look at in this article—the RB5X and the XR-2—have the letter *x* in their names to denote that the models are still experimental.

So don't get too excited. Or rather, get excited, but be prepared to wait a while for truly cost-effective robots that are useful in the home. None of the five robots we'll talk about here can wash windows, walk the




RHINO XR2



dog, mow the lawn, clean the pool, or change diapers. None of the robots—RB5X, XR-2, Armdroid 1, Tasman Turtle, or Topo—can carry on an extended conversation.

Mechanical Teachers. Most of the robots currently available for home use are educational products more than they are household servants—though the latter is the goal. By far the largest number of inexpensive robot arms and turtlelike devices is in education—for teaching programming and the basics of robotic technology.

The Tasman Turtle is the latest version of a robotic teaching device that's been around for decades in various and sundry forms. Basically, a turtle is a mobile, desktop device that can be programmed to move around in complicated patterns, mapping its movements on-screen with turtle graphics. But, unlike most robotic turtles, the Tasman Turtle can talk.

The two robot arms we'll look at, the XR-2 and the Armdroid 1, could conceivably be used in manufacturing but are being touted principally as robotic teaching devices. Robotic arms, modeled after the human variety—with shoulder, elbow, wrist, and hand or manipulator—will become parts of multifunctional home robots in the future. By becoming familiar today with the concepts and technology needed to coordinate the complex movements of mechanical manipulators, we can prepare for the future.

RB5X and Topo are the forebears of the true personal home robots—intelligent, mobile, communicative, practical—that may some day become a part of daily life. Soon these robots should be able to vacuum the floors, guard the house, monitor atmospheric conditions, and do many things as yet unimagined.

Miraculous Mechanicals. Let no misunderstanding arise. The robots we have today are truly remarkable. Thirty years ago, this article would have been science fiction of the highest order.

As a society, we've entered the computer age, and in the high-tech future robots may become our trusted companions. Like cars, computers, and telephones, robots will function as extensions of our physical and mental selves. Personal robots will give us more free time and, as they become more intelligent, may truly add something to the human experience.

Get ready for an all-too-brief journey in a personal robot wonderland.

Androbot Topo

Topo, from Androbot, comes in an impressive white cardboard box—four feet tall and a few feet wide. Half an hour after opening the box and removing the thirty-three-pound plastic and steel robot, it's possible to have the little fellow up and running with either joystick or keyboard control.

Looking like a cubist's rendering of the modern man, Topo is the only currently available robot that could be described as humanoid in shape. Its superficial resemblance to a human is reflective of its limited mental abilities—we're still years away from a walking, talking, thinking, and performing humanoid robot with human intelligence.

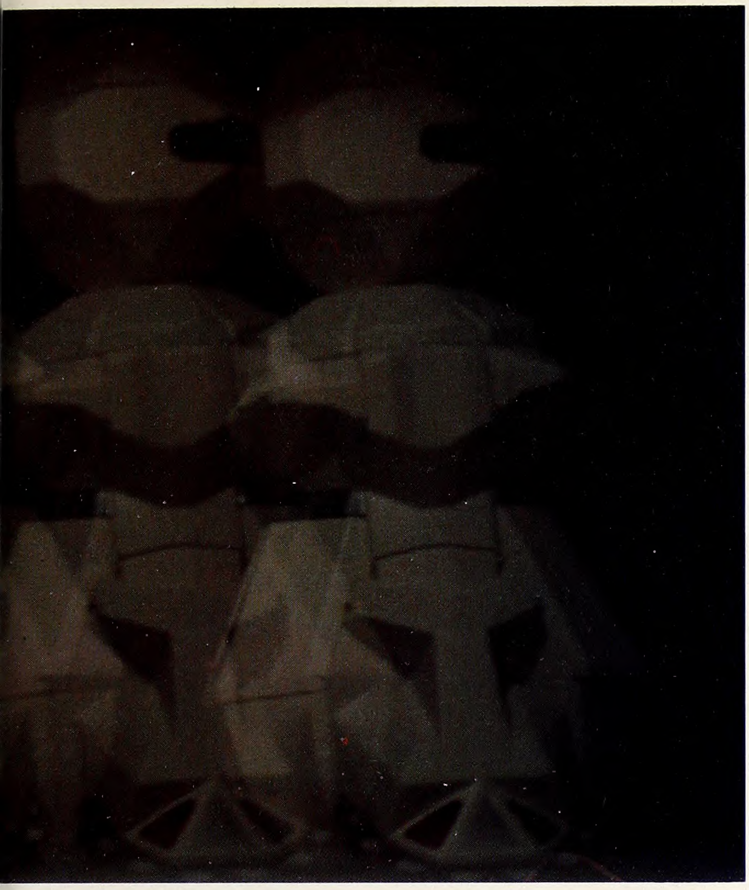
We must be patient. Two years ago nothing like Topo or his soon-to-be-released cousin B.O.B. was available. Unless you were a hobbyist—building your own robots—the only robotic products available to you for the Apple were the Terrapin Turtle and Muse's game *RobotWar*. Now, two years later, there are literally dozens of robotic avenues you can explore on the Apple. Two years from now, there could be hundreds.

An Andro What? Topo is the easiest of the current batch of personal robots to relate to. Currently mute and sensorless, by October Topo should have voice synthesis capabilities and a wireless infrared digital communications link. The basic unit available now is capable of many different entertaining and educational functions and provides an enjoyable introduction to the potential of personal robots.

Topo is controlled at this point through a remote radio link that connects to the Apple via an expansion board in slot 5.

The robot moves around on two wheels, with separate drive motors for each. Power to the motors is supplied by on-board batteries, and the robot is usually charged and ready to go when it's delivered. The batteries are easily recharged using the battery charger included with the robot.

Topo's power is turned on and off by means of pushbuttons on its back panel. The robot has two plastic side flaps that fold out and can



hold lightweight objects.

The easiest thing to make Topo do is move around in response to a joystick. The robot comes with a disk containing several Basic programs that are easily accessed from preprogrammed subroutines. The joystick routine allows you to move Topo anywhere you like within a radius of seventy-five feet.

Topo is ruggedly built, but he's only as smart as his owner. It's up to the owner to keep the robot from smashing into the wall or falling down stairs. Topo can be stopped immediately by pressing the panel on top of his head, which turns off the whole mechanism. This is particularly useful when you're using preprogrammed Basic or Logo routines. Topo moves along at a brisk pace and can quickly go astray if the user/programmer hasn't planned out a clear path.

Programming Topo in its TopoBasic is a snap, even for those who aren't terribly familiar with the ways and wherefores of gosubs and for-next loops. The commands are easy to remember—TFD moves Topo forward; TBK moves Topo back; TRT turns Topo right; TLT turns Topo left. Extended movements are possible through the commands TFDX, TBKX, TLTX, and so on. These commands can be used as subroutines with variable inputs. For instance, typing N=200 and then GOSUB 5100 (the subroutine TFD) causes Topo to move forward two hundred steps.

Dance of the Androbot. It's possible to do some interesting things with Topo and its Basic. You can make the robot travel in a figure eight, a circle, and other geometric shapes. You can make Topo perform a little dance with the TSTEP, TSTOP, TSTEPSTOP, TCOUNT, and TSET routines, which allow precise control of each of the robot's wheels.

At any point, it's possible to calibrate Topo's motors to have more precise turning angles and movement increments by accessing a simple TopoBasic subroutine. This comes in handy because Topo's inertia and the surface he's traveling on can affect the precision of his motion.

Topo also works with Androbot's special version of Logo—TopoLogo. The TopoBasic commands of TFD, TLT, and so on have been incorporated as procedures—modular program units. Regular English words are used whenever possible and allow the easy construction of fairly complex programs. For instance, the line REPEAT 4 [TFD 50 TRT 90] causes Topo to move in a path the shape of a square.

You can define your own procedures with TopoLogo in the edit mode. Typing in TO SQUARE and REPEAT 4 [TFD 50 TRT 90] creates a procedure called SQUARE that you can recall and insert in a program as you see fit.

TopoLogo includes a variation on turtle graphics, wherein a line drawing of Topo's movements is sent to the Apple's screen. Using either joystick or keyboard control—both are possible with TopoLogo—you can instruct Topo to move while you watch his path on the screen. You can define the size of the room that the robot is exploring; if the value you supply is too small, then Topo's graphic path will wrap around on-screen, creating confusion.

It's possible simply to draw pictures with Topo and TopoLogo graphics or to do interesting things like drawing maps of your house by leading Topo around the edges of rooms and around obstacles such as tables and chairs.

Go Forth, Young Bot. In addition to TopoBasic and TopoLogo, the robot can also be programmed with TopoForth, a language offering Logolike turtle graphics and a versatile programming environment. Forth—the most popular motion-control language in industrial robotics—is very fast and its memory requirements are modest.

The manual for Topo is easy to follow and contains listings of the TopoBasic programs. The manual makes it easy to get started and, at the same time, encourages the user to experiment with programming. Kids should have no trouble using it.

Topo is a very entertaining way to learn about computers and programming right now. For the young in age and the young at heart, it can be the ultimate game and educational peripheral. In the near future, when it is equipped with speech synthesis and such accessories as the AndroWagon—a small cart that attaches to Topo's backside, due out this month—Topo will be even more attractive. (Yes, Topo could even serve drinks to your guests.)

Androbot, under the visionary guidance of Atari's founder Nolan Bushnell, is promoting the notion of personal robots in the home with gusto. The basic Topo unit just described is only the beginning of what promises to be an ever-increasing line of home robotic systems.

The goal of an autonomous robot—one that you could program to perform a task, put in a room, and walk away from—will be realized with another Androbot product expected to be released at the beginning of next year.

Although outwardly similar to Topo, B.O.B. (brains on board) is a more sophisticated and functional robot. B.O.B. supports two Intel 8086 microprocessors and features three megabytes of operating capacity. B.O.B. is programmed with ACL (Androbot control language)—which has some of the characteristics of Forth—via an Apple (or any other keyboard with an RS-232C interface) acting as an ASCII terminal.

B.O.B. will be equipped with the AndroBus, which facilitates the easy expansion of the robot. The company is following the philosophy evident in the Apple II: Provide for plenty of expansion capabilities from the start. Eventually, B.O.B. will be programmable with plug-in cartridges. The cartridges will be available not long after B.O.B. is released.

Androbot's Big Boy. B.O.B. will have ultrasonic sensors for determining the position and range of objects, as well as infrared sensors for avoiding objects or following a human. B.O.B. will have a speech synthesizer chip and will offer users the option of building up its vocabulary. It will be possible to program the robot to recognize your voice and follow simple instructions.

Androbot plans to offer optional hardware accessories, such as the AndroFridge—a device for storing canned drinks that B.O.B. can use without assistance. At the summer Consumer Electronics Show in Chicago, B.O.B. impressed the crowds by fetching a can of beer from the AndroFridge and bringing it to an Androbot employee. With AndroSentry, one of the planned plug-in cartridges, B.O.B. will reportedly be able to patrol and safeguard your house.

Androbot's F.R.E.D. (friendly robotic educational device) is a turtlelike robot small enough to fit on a table top. With a drawing-pen attachment and a voice synthesizer, F.R.E.D. is similar to educational robots of the past and to the present-day Tasman Turtle. Using a joystick, the Apple's keyboard, or a completely separate infrared controller, adults and children alike can learn the basics of programming and robot intelligence. F.R.E.D. will have software similar to Topo's and should be available toward the end of 1983.

How to quickly re

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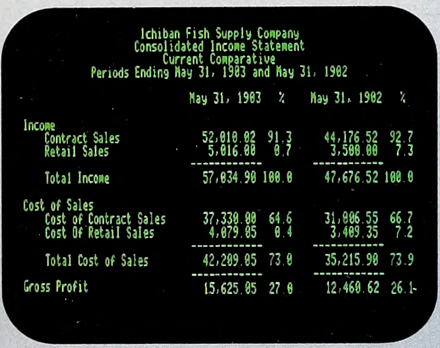

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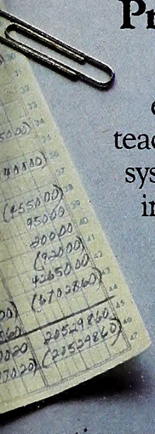

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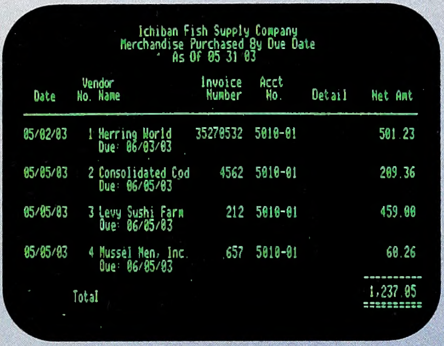

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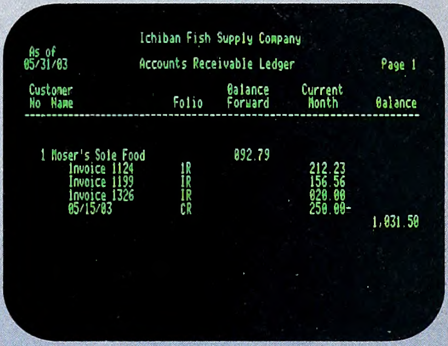

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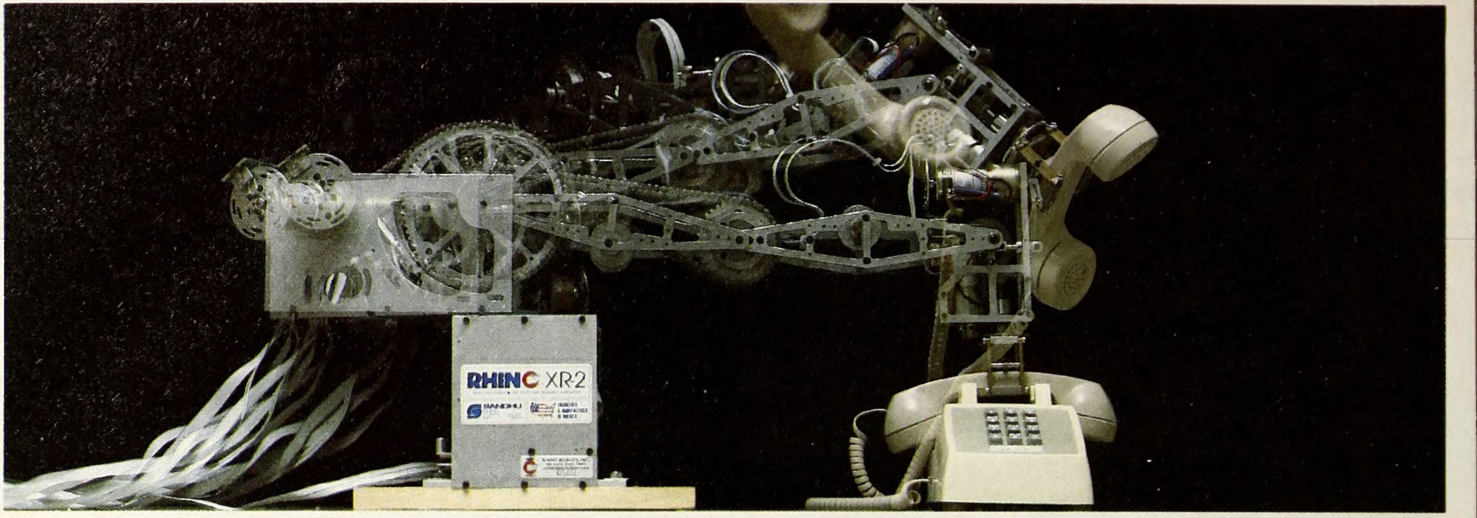


Rhino Robots XR-2

The XR-2, from Rhino Robots, is a tabletop robot arm designed for education, research, and industrial planning. As such, it may seem a little out of place in an article about home robots. Still, an understanding of the technologies governing the operation and programming of robotic arms is essential if we are to realize the dream of a functional home robot that could simplify our lives.

Made of aircraft-grade aluminum, the XR-2 is reasonably lightweight—a little under thirty pounds—and it has no riveted parts so it's easy to disassemble for investigative and educational purposes. The robot arm requires a separate power supply and controller for its standard six motors. Rhino provides such a controller, which can also handle two more motors for such additional devices as a chain-belt conveyor for bringing parts within reach of the robot and a linear slide base for moving the whole robot along a horizontal axis.

The XR-2 stands approximately thirty inches high when the arm is fully extended vertically and has a reach of approximately twenty-two inches when the arm is fully extended horizontally. The robot is thirteen inches wide.

Meeting Mechanical Arms. A robot arm like the XR-2 is modeled after the human arm, but the mechanical version is necessarily lacking in fluidity, speed, and maneuverability. The XR-2 has a shoulder, an elbow, a wrist, and a hand or manipulator. The arm sits on a base, which can rotate 270 degrees. The shoulder can rotate 180 degrees, the elbow 270 degrees. By comparison, most humans can rotate their forearms via the elbow joint only 180 degrees. And whereas the wrist rotation of the XR-2 is 270 degrees, human wrists are hard put to reach 180 degrees. The XR-2's hand can also rotate around the vertical axis of the wrist (imagine being able to unscrew your hand at the wrist).

Humans are definitely ahead of the game in hands, though. The XR-2 hand features two metal fingers, capable of grasping certain objects, but with nowhere near the complexity and versatility of the human kind. In fact, the task of creating more humanlike hands is one of the great challenges facing robotic researchers in the decades ahead.

Each of the XR-2's six motors—controlling the base, shoulder, elbow, wrist, hand, and the fingers of the hand—is equipped with optical encoders, making the system what is called a "closed loop system." The optical encoders are circular metal plates with holes in them that interrupt an optical beam, thus providing information on how far a motor has moved and in what direction.

Rhino provides the controller/power supply and interface card necessary to begin working with the XR-2. The peripheral card is a CCS 7710A RS-232C interface and fits into slot number 2 on the Apple II. Six cables connect the robot's motors to the controller, and an RS-232C cable connects the Apple interface card to the controller.

The CCS 7710A card is a language card, with software already written on modifiable EPROMs; so you don't even need software to get up and running on the XR-2. After connecting everything up and booting DOS, you simply type PR#2 and the robot should be ready to accept your Basic commands.

The firmware on the card allows for six commands not normally part of Basic's repertoire—"&HOME", "&STEP X,X,X,X,X,X,X,X", "&IF X THEN:", "&WAIT X", "&READ X,X,X,X,X,X,X,X", and "&CLEAR". The &STEP and &READ commands both require that all eight variables—corresponding to the maximum eight-motor outputs on the controller—be defined before the commands can be used.

There's No Place Like Home. The &HOME command executes what is called a "hard home" routine. The home position is a preprogrammed placement of the base, shoulder, and elbow joints. When programming the XR-2 it's desirable always to be starting from the same position.

The &STEP X,X. . . . command is used to start moving each of the robot's six standard motors a fixed number of steps simultaneously. The command does not ensure that each motor will take the same time for its move; those motors that have only a short way to go will get done before the motors that have a long way to go. Coordinated moves can be made by breaking the command up into smaller, evenly spaced commands.

The XR-2's &IF X THEN: command is like the standard Basic command, except that it must have a colon at the end and the condition must be stated on the same line after the colon. The X variable symbolizes one of the six motors and corresponds to the six microswitches associated with the six ports on the XR-2's controller. The command is used to monitor these six switches and make appropriate responses to them. If the called microswitch is depressed, the condition after the colon will be executed.

The &WAIT command is used to enter a pause into the operation on the robot. The &READ X,X. . . command reads the encoders and determines the distance each axis has moved from the position when these counters were last cleared. The clearing is done with the &CLEAR command.

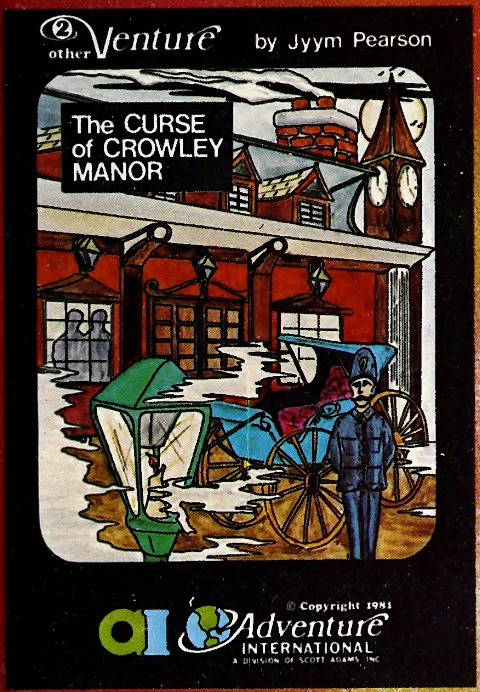
The XR-2 takes a little time to get to know. The base, body, and arm of the robot are open to view, so you can see the dc servo motors that drive the various axes and how they connect to the bicyclelike drive chains. The makers encourage you to take it apart and see how it works.

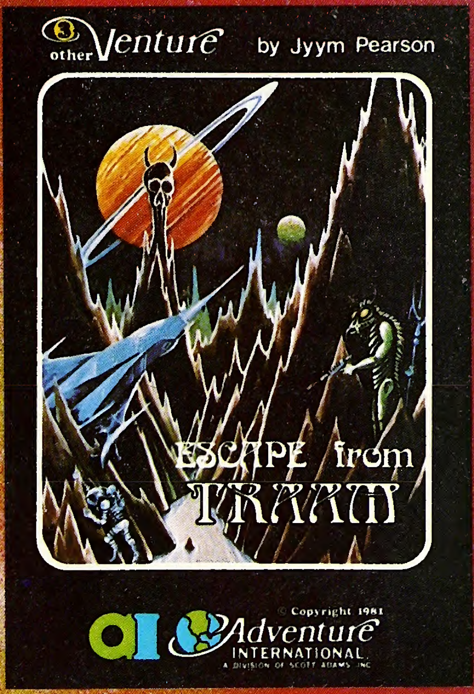
Horn of Plenty. Rhino offers several software packages that run with the XR-2 and the Apple II. The *Rhino-Rite-A* program is designed to allow the XR-2 to print two lines of letters or numbers using a felt tip pen. *Rasp #1* is a package of four programs that offer single-axis movement and multiple-axis movement. There is also a teaching program that enables you to lead the XR-2 through a series of multiple axes moves and then repeat these moves. A fourth program coordinates the robot along XYZ Cartesian coordinates.

Rhino sells the XR-2 by itself or as part of a package containing an Apple IIe or Apple III and all the attendant hardware. The company also offers several attachments, including different manipulators and a handheld teach pendant.

OTHER WORLDS. OTHER REALITIES.

(FOR EXPERIENCED ADVENTURERS ONLY!)





THE CURSE OF CROWLEY MANOR

by Jyym Pearson

You've sensed it before: nameless, unreasoning fear. Fear of the unseen — of things that scurry and scrabble through the shadows when the lights have been put out. How then will you fare when you face the Ultimate Evil; how will you possibly survive — THE CURSE OF CROWLEY MANOR?

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by Cliff Johnson and Allen Pinero

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If you're ready for a new era in Adventuring, LABYRINTH OF CRETE is just what the leech ordered! Featuring full color, hi-res graphics that depict your trek into terror, you'll be amazed at the authors' slavish devotion to the spirit of the timeless Greek characters and situations.

LABYRINTH OF CRETE comes with a detailed instruction manual that will add to your enjoyment of this unique form of Adventuring entertainment, and will operate on any APPLE 2 computer with one disk drive and 48K of memory.

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by Jyym Pearson

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All of the traditional Adventure elements are in ESCAPE FROM TRAAM, including two-world command input, game save feature, and an extensive vocabulary. Add to this the impact of colorful hi-res graphics that will allow the story to spring to vibrant, scintillating life, and you'll know that ESCAPE FROM TRAAM will be a fine addition to any graphic Adventure collection.

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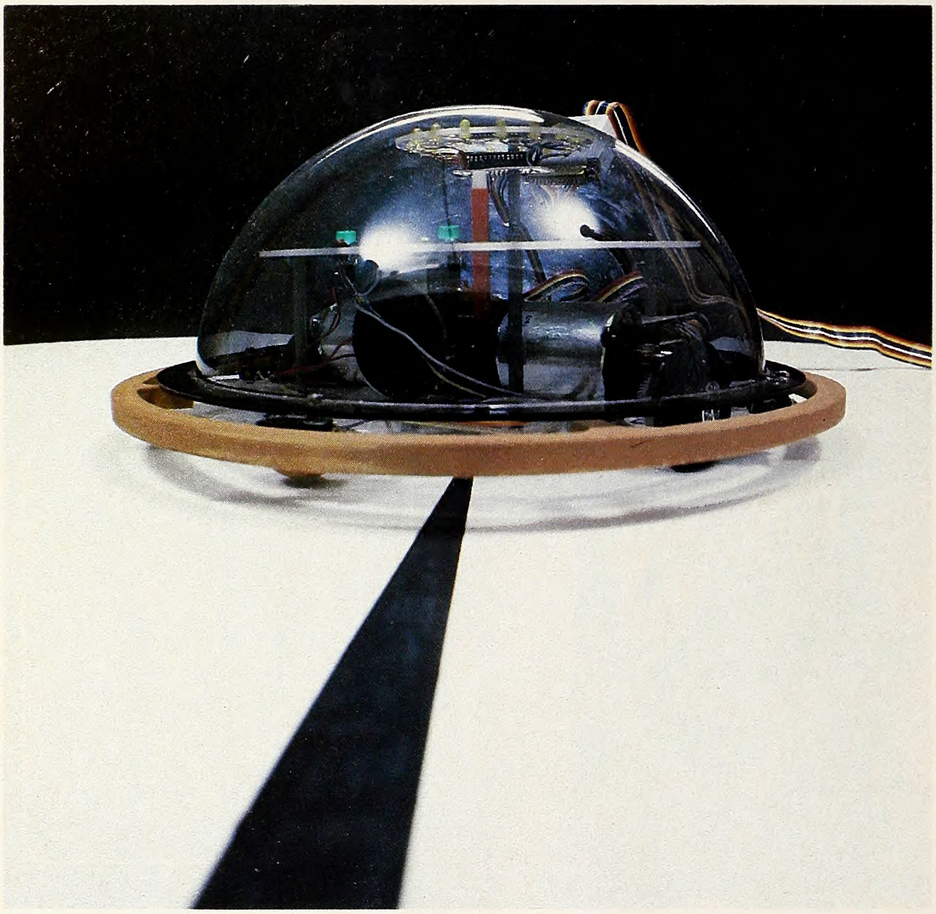

FLEXIBLE SYSTEMS TASMAN TURTLE

The manual for the Tasman Turtle calls the robot "your new pet." After a day or two, you'll realize that no pet was ever like the Tasman Turtle.

The smallest of the mobile robots, the Tasman Turtle will work equally well on the kitchen floor or the kitchen table—basically any surface that is hard and flat will do. Designed to be used as an educational device, the Tasman Turtle combines the drawing and moving features of past turtles with the ability to talk through voice synthesis.

The genesis of the Tasman Turtle occurred in the seventies at the Elizabeth Computing Centre in Hobart, Tasmania, Australia. Working there in the late seventies, Allan C. Branch designed the Tasman Minimum Turtle, which in 1981 was introduced to the Australian market; Flexible Systems was established to manufacture and market the device.

The Tasman Turtle was first equipped with voice synthesis last year, and, at the same time, Harvard Associates was formed to market and distribute the educational robot in the United States. The turtle is also distributed in Canada, New Zealand, New Guinea, Hong Kong, South Africa, Japan, and Singapore.

Touchee Turtle. Looking like some kind of surveillance or repair "droid" you'd expect to see in a *Star Wars* film, the Tasman Turtle has a clear plastic cover shaped like a dome.

At the base of the dome is a slightly bigger plastic ring that serves as the outer edge of the round robot. The ring sits loose in the robot's frame, and, when pushed against it, gives a little. When pushed hard enough the ring trips one of four sensors. It's possible to program the Tasman Turtle so that it reacts in a certain way when one of the sensors is tripped by an obstacle.

The robot travels around by means of two small rubber wheels. It's not a speed demon—how many turtles do you know that are? A separate power supply is needed to power the robot.

The Tasman Turtle can move forward and backward and turn left or right. Through the plastic-dome covering you can see the motors, the robot's body, and the hardware boards that allow it to be controlled by a computer. Two small green lights serve as the robot's "eyes"—they don't see anything, but they do blink on and off (depending on what's going on in the program). Between the eyes are four red lights that correspond to each of the four sensors activated by the outer ring. Below the eyes is the speaker, through which the Tasman Turtle talks.

At the apex of the dome is a circular row of yellow lights, the turtle's compass (available as an optional attachment). At the center of the robot's body is the mechanism that raises and lowers a felt tip pen when you're using the turtle to draw. The robot also features a programmable electronic horn that sounds like it's reminding you to put on your seat belt.

The interface card for the Tasman Turtle is designed to go in slot 2 of the Apple. The card is connected to the power supply with a single wire and the card is connected to the turtle with a single ribbon cable. The Tasman Turtle is not autonomous; it must be connected up to the computer with the ribbon cable at all times.

Tasmanian Devil. Like Topo, the Tasman Turtle comes with its own indigenous software. It also is compatible with Terrapin Logo. Booting the Tasman Turtle Control Software disk is the best way to get started.

One of the demonstration programs on the Tasman disk allows you to control the turtle with one-letter commands—F (forward six inches), B (back six inches), R (pivot right forty-five degrees), U (pen up), D (pen down), and so on. Another program lets you use the robot's horn to make sounds like those used to signify the dots and dashes of Morse code.

Once you're acquainted with the robot's features, you're ready to start programming it with Tasman's Turtle Talk commands. All commands must be prefixed with the ampersand symbol. Most of the commands are one letter and some require a variable. For example, typing &F 10 causes the turtle to move forward ten steps—one step is equal to about one millimeter.

The Turtle Talk commands can be used in a Basic program or in immediate mode. In the latter, it's possible to set up a whole string of commands separated by colons. For instance, the line

```
&D:&F30:&R90:&F30:&R90:&F30:&R90:&F30:&R90:&U
```

instructs the robot to put its pen down on the paper, travel in the shape of a square, and then lift the pen up again. Assuming you've put a piece of paper under the robot, it should draw a perfect square.

Tasmanian Turtle Graphics. Using the MIT (Terrapin or Krell) version of Logo, it's possible to explore turtle graphics and speech synthesis with the Tasman Turtle. Creating procedures that can be defined and used in larger programs is accomplished in the same way as it was with Topo.

With Logo, the Tasman Turtle can display its movements graphically on the Apple's screen. Program options allow you, at any time, to control only the actual turtle, only the screen turtle, or both.

The Tasman Turtle with Logo currently has a vocabulary of approximately three hundred spoken words—including each letter of the alphabet and many numerical words for use in creating long numbers. Each of these words is assigned a number. The command for instructing the robot to say a word is SAY x, where x is the number of the word you want spoken. For example, typing SAY 132 causes the robot to say the word *space*.

With the SAYL command it's possible to make the Tasman Turtle speak a list of words as a sentence. Typing SAYL [34 138 30 235 227 2

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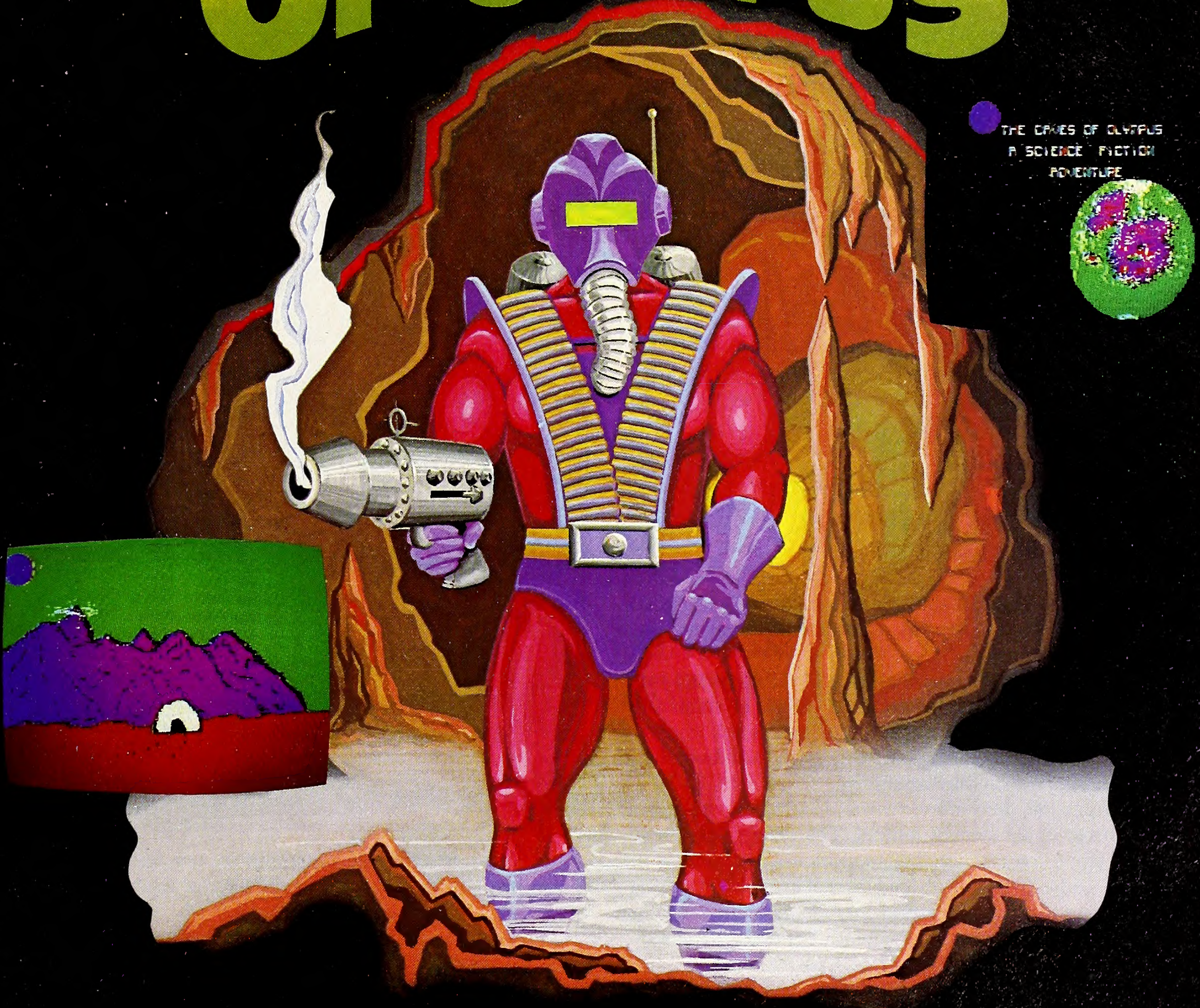

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138 255] causes the robot to proclaim, "See the million press onward to the south." The SAYL command also enables you to combine prefixes with root words to make new words. For instance, typing SAYL [72 106]—72 is the word *centi* and 106 is *meter*—produces the word *centimeter*.

Two further word-creating commands are not included with the package, but a listing of the brief Logo programs needed to construct them is included in the manual. These two commands are EW and SW and they work in similar ways—instructing the robot to say a word and insert a silence either at the beginning or at the end of the word. These commands make it possible to create new words by splicing together parts of existing words. For instance, the line EW 147 50 should result in the word *arms*. The EW command cuts off the beginning of word 147, *alarm*, and then picks up word 50, the letter *S*.

Turtle Teacher. The Tasman Turtle is not an expensive toy that you'll tire of in a day or two. With its already ample features and the ability it gives you to program more of your own, the Tasman Turtle has tremendous potential as a learning tool. Combining movement, sensors, drawing, speaking, and the other features in one program is quite an accomplishment.

The recommended tack if you want to explore the Tasman Turtle is to put yourself in the mind of the turtle. The fact that a robot is only as smart as you make it is a general rule that may never change. The first step in making a machine do your bidding is to know how the machine thinks and how it relates to the world. The Tasman Turtle offers an easy and entertaining way to explore these concepts.

Flexible Systems, through Harvard Associates, is planning to release more robotic products in the United States soon. A smaller version of the Tasman Turtle, geared more toward the home, is in the works. And soon there should be a vision system and a robotic arm for the present Tasman Turtle, as well as increased speaking abilities, including a larger vocabulary that may offer foreign words.

Colne Robotics Armdroid 1

Armdroid 1 has a soft touch. If the application you have in mind is the mass production of doughnuts, this reasonably inexpensive robot arm may be just what you need.

Armdroid 1, produced in England by Colne Robotics, is less muscular than Rhino's XR-2. It features the same five axes of rotation as the XR-2, however, as well as a more versatile three-finger hand. Aimed at the hobbyist and robotic educator/student/researcher, Armdroid 1 can be purchased either as a kit or fully assembled.

Arming Your Apple for the Future. Armdroid 1 requires a separate power supply to drive its six stepper motors. The orange, string-and-rubber-belt-driven arm rotates 360 degrees on its base, 180 degrees at the shoulder and wrist, and 270 degrees at the elbow. The three-finger gripper rotates 360 degrees around the vertical axis of the wrist, providing both yaw and pitch. A continuous path machine, Armdroid 1 can move along several axes at once and do a series of separate moves.

An interface card and connecting cable provided by Colne plugs into slot 1 on the Apple II. The cable connects into the base of Armdroid 1. The robot's power is supplied by a connecting cable to the separate power supply.

Currently, a menu-driven general-purpose program on disk is included with Armdroid 1. This program enables the user to lead the arm through a desired path point by point, location by location. These points are symbolized by five-digit numbers, and moves are accomplished with single keystrokes.

Once you've defined the home position at the beginning of operations, any new points are expressed in numbers relating to the individual motor's distance from the home position. It's recommended that the user decide on a home position and always move the robot into that position manually before starting up.

When you first connect up the Armdroid 1 and boot up the software, it's fun to fool around with the "insert a point" option. You walk the arm through a series of moves along any or all of its five axes. The program can store a series of points, which can be saved to disk, but it won't *save* any points unless you tell it to.

A point is considered the present location of the arm, and the next point is the next location designated by the robot's operator. Once you've walked the robot through a task, it's simple to save the points and have the robot repeat the moves, provided you start it from the home position. Any unwanted points can be easily taken out with an edit function. Armdroid 1 is not really programmable in the usual sense on the Apple.

Nevertheless, the Armdroid 1 is a good way to experience the challenges of programming the movements of a robot arm. For example, if you walk a robot through a movement, you end up with a starting point and an ending point. Now suppose there is a six-inch obstacle that the robot must pass over to reach the end point. If you've saved only the beginning and end points, the robot will collide with the obstacle. You can perform other interesting educational exercises with Armdroid 1.

Colne Robotics set up an impressive demonstration program at a recent robot convention (InteRobot '83—held June 14–16 in Long Beach, California). In that demo, the Armdroid 1's three-fingered hand held an eyedropper. The robot first took a little water into the eyedropper from a small glass container. The arm then moved over to a row

of test tubes, dropping the water into the first test tube in the row. The robot then got more water and delivered it to the next test tube. The robot didn't spill a drop all afternoon.

With a little patience, and a few extra eggs, you could probably program an Armdroid 1 to load eggs into a pan of boiling water.

The Armdroid Strikes Back. Colne Robotics says it will release the Armdroid 2 either late this year or early next year. The newer version will have seven axes of movement, each with its own Z-80 processor. Armdroid 2 will be more powerful, able to lift four pounds as opposed to the Armdroid 1's limit of three hundred grams.

The Armdroid 2 will also feature an inexpensive vision system. A camera measuring three inches long and one and a half inches wide will provide an image thirty-two pixels by thirty-two pixels. The vision system is meant more for educational use than as an industrial-grade device, because the low resolution will enable the robot to recognize only a limited range of objects. A slightly more expensive version will feature encoders on the motors, making Armdroid 2 a closed loop system.

Colne Robotics is also planning to release the Zeaker—a turtlelike device—late this year. Zeaker will be a two-wheel robot, with a simple tactile sensing system and a pen attachment so that it can draw a picture as it moves around. With a specially configured parallel card, Zeaker will be programmable with the Apple II.

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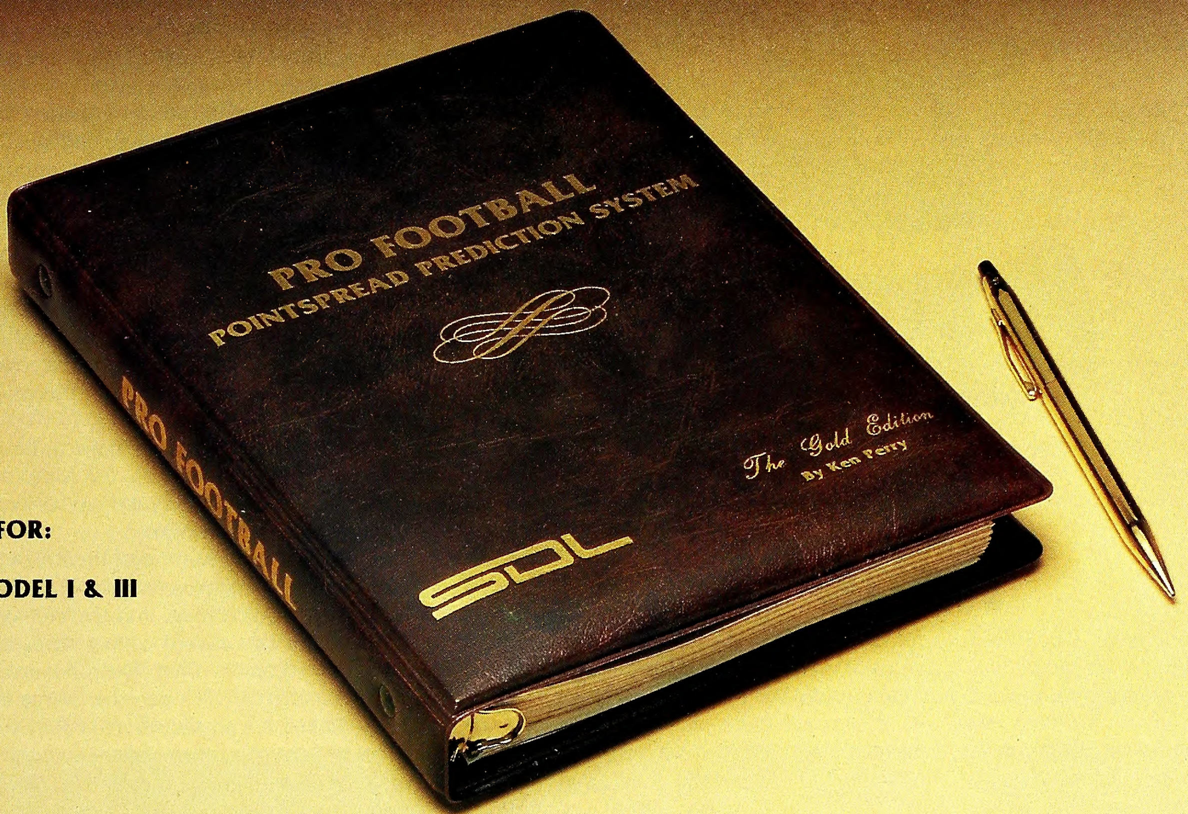

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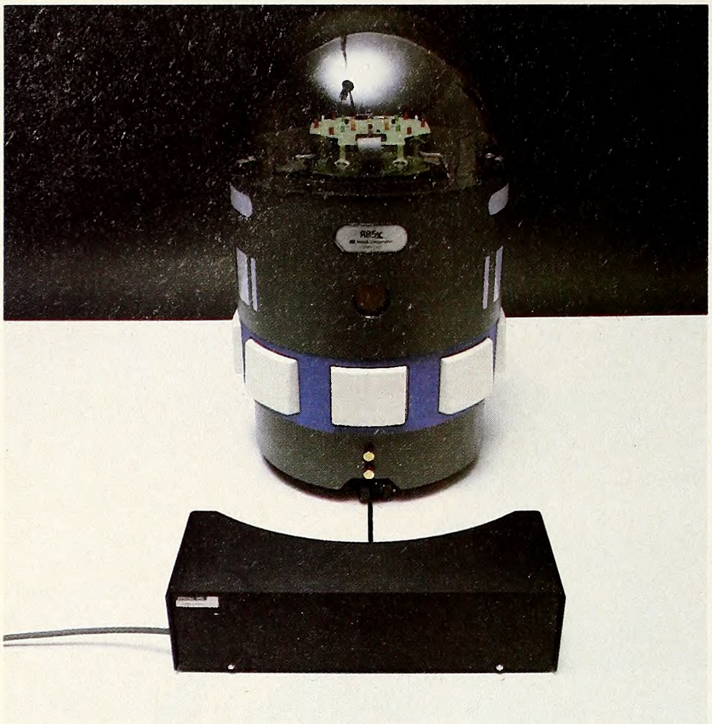

RB Robot RB5X

RB5X, from RB Robot Corporation, looks like R2-D2's little brother. Bullet-shaped, mobile by means of two separately driven wheels, RB5X is as charming as R2-D2 on the outside, but it's not likely to get involved in any far-flung rebellions, at least not quite yet.

Designed for the home, the classroom, and light industrial environments, RB5X is the harbinger of future autonomous personal robots that speak, hear, and perform a variety of useful functions. The current version of RB5X is still in the experimental stages and is being improved all the time. But the basic unit is designed to be expanded, so if you picked up one tomorrow, you wouldn't miss out on all the goodies to come.

LED Wars. The top of RB5X is a clear plastic dome through which you can see a transparent plate that holds several LEDs. The green LEDs indicate the direction in which either of the two motors is going. The red LEDs correspond to the eight bumper sensors that girdle the robot about a third of the way up its outer shell. If you press one of the bumpers, the corresponding red LED lights up.

When you look through the clear plastic plate that holds the LEDs, you see the hardware bus that facilitates further expansion of RB5X. The robot's on-board processor, National Semiconductor's INS8073, is in one slot. Another slot is slated to hold extended memory, and there are four additional slots through which to connect other boards.

On the front of the robot's body, beneath its name plate, is a sonar sensor for detecting obstacles at a distance. Below that are two brass charging pins that recharge RB5X's onboard batteries. On the back of the robot is an interface plate that houses the RS-232C connector, reset button, and power switch.

RB5X communicates with your Apple via the computer's RS-232C interface and a communications package, such as Southwestern Data Systems's *ASCII Express Professional*. The user must provide the required interface card, such as Apple's Super Serial Card or others commonly available, and the terminal software. You can experiment with different baud rates, but the company recommends 1200 baud.

You communicate with RB5X in Tiny Basic. A few additional commands are needed to establish communication between the Apple and RB5X, and these are covered in the manual.

Once you've interfaced the Apple and the robot, it's simply a matter of downloading instructions to the robot via an RS-232C cable. As soon as the instructions have been downloaded, you just unplug the interface cable and away goes RB5X.

Three Tiny Reasons. Tiny Basic is a version of Basic that lacks such features as arrays or real number arithmetic. It's a special-purpose machine control language that should pose no problem to someone who is already familiar with regular Basic. RB Robot chose Tiny Basic for three reasons: It allows direct access to memory for fast input and output; it permits accurate timing; and it has a built-in random number generator.

Tiny Basic allows you to create your own programs. Also, RB5X comes with a disk that contains several demonstration programs designed to familiarize you with the robot's unique features.

RB5X learns by what is called "evolutionary adaptive machine intelligence," a term coined by hobby robotics author David L. Heiserman in his book *Robot Intelligence with Experiments*. Heiserman's scheme breaks robot programming down into three levels of machine intelligence: the Alpha-class, the Beta-class, and the Gamma-class.

An Alpha-class robot responds to its environment with pure reflex action. When you run RB5X's Alpha-class demonstration program, the robot moves forward until one of its bumpers or its sonar detects an obstacle; it then moves away from the obstacle, randomly choosing a new direction. A Beta-class robot acts randomly at the start, but it gradually learns its environment. This learning happens through the repetition of moves that result in either successful or unsuccessful reponses and the Beta-class robot's ability to remember successful responses. A Gamma-class robot has memory and the ability to generalize—to formulate theoretical knowledge of the future.

In the near future, RB5X's creators hope to have Gamma-class intelligence for the robot. In the meantime, the Alpha and Beta demo programs on the disk provided with the robot are an excellent introduction to the mysteries of machine intelligence.

One of the most promising features of the RB5X is its ability to seek out its own recharger pack and plug itself in. The robot is equipped with a separate battery charger that plugs into the wall and sits on the floor. The charger consists of two curved copper strips attached to a small metal box a little wider than the robot. The robot is equipped with a low-battery sensor circuit that tells it when the charge is low.

Charge of the Robot. It's possible to make RB5X find its own way to the charger. This is done by putting down a strip of tape that contrasts with the color of the floor—light tape for a dark floor and vice versa. The tape should lead from the edge of the charger into the middle of the room in a straight line. By means of its light/dark infrared sensor, RB5X can locate the tape and follow it to the charger. The robot will press its two copper charging pins against the metal strips of the charger automatically and one of its sensors will indicate when this is accomplished.

RB5X is equipped with voice synthesis and voice recognition. It can talk to you and you can talk back to it. Using the sixty-four phonemes supplied on a standard speech synthesis chip, you can create just about any word in any language. RB Robot Corporation is in the process of improving the voice-recognition aspect of the robot and should have a newer system out later this year.

Among the many new features that RB Robot plans for the RB5X in the near future is a robotic arm that will attach to where the plastic LED plate is currently located. The arm will come with an extension to the shell, raising the overall height of the robot, and will be able to lift weights of twelve ounces as well as to reach around the robot's back and turn it off.

One home robot application we've all been dreaming of will be possible later this year when RB5X's vacuum cleaner attachment is made available. Currently still in the testing stage, the vacuum unit will attach to the back of RB5X near the ring of bumper sensors. With the proper programming and preparation on the part of the human operator, it'll be possible to turn RB5X on, walk out of the room, and come back after half an hour to a clean carpet. No kidding!

Looking for the Right Script. RB Corporation has just announced the soon-to-be-available Robot Control Language (RCL) and *Savvy*, a tool for developing scripts, or programs, that are written in a high-level *Savvy*-like language, compiled into Tiny Basic, and then downloaded to the robot. The program development tool was created for RB Robot by Excalibur Technologies, the originators of *Savvy*.

Also due out this year is Logo compatibility for RB5X and the RB Trailer, a small cart by which the robot can haul lightweight objects. The

robot will also be programmable with plug-in EPROMs this year.

Last but not least, RB5X will have an optional fire extinguisher attachment, available late this year or early next. With a powerful heat-detecting sensor, the robot will be able to distinguish between varying heat sources such as sunlit spots in a room, a living creature, and a fire. If it detects a fire, a small flap on the side of the robot will open up and a fire extinguisher will douse the flames.

At present, personal robots are one of the most expensive peripherals you can buy for your Apple. The five robots discussed up to now range in price from around five hundred dollars to upward of three thousand. But the price situation will change for the better in the years to come. Just as computers have come down in price even as their capabilities have increased, personal robots will also become more affordable once the demand warrants it and the technology becomes more accessible.

We must be patient.

Three-Mile Bot. For the adventuresome—the robotic hobbyists among us—there are many exciting alternatives to explore. One such alternative involves combining currently available systems into something more than the individual elements. A robotic hobbyist can become, in effect, a fledgling Dr. Frankenstein—creating "life" from a number of dead parts.

Russell Swannuck is one young robot hobbyist who actually saw his creation go on to perform a practical function. About a year and a half ago, Swannuck developed an idea for a mobile robot with a robotic arm attached.

With the help of his father, Swannuck acquired a Microbot-5 robotic arm and attached it to a radio-controlled mobile base. Using an Apple II, Swannuck programmed the robot arm to perform simple tasks. Through his father's business, Swannuck found out that the General Public Utilities Corporation (GPU)—which operated the Three Mile Island nuclear power plant near Harrisburg, Pennsylvania, and was in charge of cleaning up at the plant after the accident in March 1979—was looking for a device similar to what he had created.

GPU eventually purchased Swannuck's robot and used it to explore contaminated areas of the damaged power plant. Operators instructed the robot while watching its point of view on a monitor displaying the image from a video camera attached to the robot arm. Swannuck had also written software so that the encoders on the arm would send a graphic representation of the arm's position to the Apple screen.

Swannuck's robot served GPU faithfully for months at Three Mile Island. Swannuck has since gone on to other things—college and a research job, where he's investigating robotics and cybernetics and their significance to the handicapped.

Meanwhile Microbot, the company that produced the Microbot-5 arm used by Swannuck, is still producing robot arms that run with the Apple and other RS-232C-compatible devices. Current products are the MiniMover, the TeachMover, and the Alpha.

Personal Robotic Future. The idyllic scene on the cover of this issue is meant to symbolize the potential of personal robots. The gentleman playing chess against a robotic challenger is surrounded by his other home robots—personal companions, helpers, and advisors. The picture is meant to stimulate your imagination, while dramatizing the compatibility of humans and robots.

For those of us who just can't wait for the future, the hobbyist scene is bound to prove interesting. But not everyone can relate to the challenge of actually assembling a mechanical being. Programming one that's already built is tough enough for most.

Robotics technology is not easy to grasp. That is why we have educational personal robots like the Tasman Turtle, XR-2, RB5X, Armdroid 1, and Topo. Soon, when B.O.B. and the fully equipped RB5X are available, we'll start to see the real McCoy—robots that perform useful tasks in the home. We can meet the future on equal terms by learning about it now.

Androbot, 101 East Daggett Drive, San Jose, CA 95134; (408) 262-8676. Colne Robotics, 207 N.E. Thirty-third Street, Fort Lauderdale, FL 33334; (305) 566-3101. Harvard Associates, 260 Beacon Street, Sommerville, MA 02143; (617) 492-0660. Microbot, 453-H Ravendale Drive, Mountain View, CA 94043; (415) 968-8888. RB Robot Corporation, 14618 West Sixth Avenue, Suite 201, Golden, CO 80401; (303) 279-5525. Rhino Robots, 2505 South Neil Street, Champaign, IL 61820; (217) 352-8485.

Kiddin'

by K.O. Eckland

This may be a bit late in coming. I'm almost positive that, for the most part, if you are a reader of *Softalk* you have already passed the point where the wealth of information and wisdom contained in this article will be of value to you. In fact, that it got this far is testimony to either the dearth of material necessary to feed the monthly furnaces of this magazine or the indifference of the editor toward journalistic judiciousness.

Then again, on the assumption that there is hand-me-down value to *Softalk*, chances are good that this copy might well fall into the hands of one who is standing where we have all at one time stood—on square one. It is to this individual that I dedicate the valuable substance of (1) justifying the purchase of a computer to (a) him or herself or to (b) a mate, and (2) sneaking it into the house without causing too much commotion.

Justification. When I wish to demonstrate my prowess as an impulse buyer, I find I'd be much more comfortable if I could shore this up with the supernatural power of a financial wizard. Unfortunately, neither of the two share any concurrence within my character. Fact of the matter is that one is totally nonexistent, so I live in a fantasy world wherein I try to limit my impulses to under one dollar. This doesn't always work—witness that computer sitting over there.

Why impulse-buy a computer, of all things, you ask? I wish I had a sensible answer. Sales resistance, a property of which I have an overabundance, has nothing to do with it. I decided that I wanted a computer more than almost anything else long before I ever went into the store.

Consider the scenario—I am in a field of employment where a business computer ranks in priority right behind an antitank cannon. A home-style computer, so useful in managing the monthly budget, finds me totally devoid of any such budget. The computer's forte is math and I don't know math from a hole in the ground. My only mathematical requirement is the reconciliation of a monthly bank statement, and the bank seems to be doing all that for me, perhaps out of sympathy. I have no children at hand to subject to the computer's incredible ability to teach, and I certainly don't need further education, knowing everything as well as I do.

Therefore, armed with these facts, you can see why I needed a computer. I had to have one. And, by forgoing meals for the next four years, I found that I could justify buying one.

Sneaking It In. About a year ago, I hauled two very large boxes into the house as quietly as I could, in hopes she wouldn't notice their arrival. She did.

"Now what? More toys?" She has this insane attitude regarding my inability to reach full maturity.

"It's sort of a . . . calculator." I tried to stand in front of the two cartons.

"A calculator comes in two boxes? I thought they were supposed to be getting smaller?" She peered around me and spotted the name "Apple." I do wish those packaging people would be a bit less flagrant about the way they mark up their boxes. "I thought Apple only made computers. . . ."

Item: Never marry a girl who reads.

"Aah, but you can calculate on them, if you so desire." I threw the full weight of my logic at her. "And you can do a whole raft of other things, as well."

"How much, ace?"

I had to move fast. "Take recipes, for example. You can store all your recipes on this machine. Just think of it—every recipe you ever had can be. . . ."

"How much?"

Realizing that the simple, domesticated part of her brain could probably run circles around a computer when it came to recipe storage, I tried a different tack. "And it's the world's greatest file cabinet. Anything you can store in a file cabinet can. . . ."

"I need a file cabinet like I need fingers sticking out of my navel. How much?"

"Around a thousand."

"How around?"

"Sort of like two. . . ."

on the Keys

I suppose I needn't go into the graphic details about causing yet another rift in a tenuous marriage arrangement, nor the ensuing cold and ominously silent dinner with which I was provided that evening.

Her attitude gradually softened as she considered my string of past follies, like the rusted Civil War musket I picked up at a yard sale or the clarinet I plan on learning how to play one of these days. Badges of an inveterate impulse buyer.

Had I everything to do over again, I would modify my sneakiness to a finer art. Some suggestions to those of you in like situations might be to open all cartons well away from the house, then bring in the equipment a piece at a time over a period of a week. It doesn't look quite as expensive that way. Some logical, and appeasing, answers to the questions that naturally follow an Apple's appearance on the scene might be, "Oh, that? That's Fred's. He's letting me use it while he's off on a safari trip to Nigeria." Another: "They're thinking of getting one of these at work and want me to run a hands-on evaluation before they make any commitment." A good light-fantasy approach might be: "I know you're not going to believe this, but I was selected from thousands to test-market this new calculator. . . ." Be certain to use the word *calculator*, since it has a less intimidating sound than *computer*. Disk drives can be explained away as being "along the same lines as Junior's thirty-dollar record player."

But, for God's sake, don't bring flowers or other conciliatory gifts after the Apple makes it debut. These only serve to raise questions; that's the last thing you want during the so-called formative period.

More Justification. Perhaps the credence with which I could justify a computer best was the potential it had for word processing; and, having the stuff within me of a great writer, I patiently explained to the bitter half how I could not only write but also edit my stories before putting them into hard print. (I have yet to break the news about my needing another expensive machine to translate those immortal words to hard copy. I would appreciate any suggestions from those of you who have gone through similar problems and remained married.)

Now, in little over a year, I have not only arrived at a mutual understanding with my machine—it certainly understands me a whole lot more than I understand it—but I have put it to work for myself in several small ways. The attendant manual made the mastery of Basic child's play for one of my mental abilities (an IQ equaled only by my glove size) and I have since gone on to produce vulgar phrases that will scroll and a reasonable facsimile of a yellow horse. None of this, incidentally, seems to impress the Loved One and she even refuses to dust the computer. Can you imagine my having to dust my own computer?

In all candor, besides those rudimentary accomplishments, I have actually covered a fair portion of the Apple's purchase price with several articles and stories—and the Great American Novel is in the wings. But the biggest benefit I gained was my newfound respect for a beeping little machine whose major output still is "syntax error." It has taught me humility and appreciation of an age fast coming upon us. It has made me aware of the vital part of life that the computer is beginning to play. It has taught me how to dust.

It has also made me aware of how the computer hucksters miss the point entirely. In their haste to demonstrate the miracles a home computer can perform with file-cabinetry and recipe storage, with teaching and math and business applications, they overlook the ability of those clever little monsters to challenge the mind. Anybody who has ever worked a Sunday crossword or tried to beat Agatha Christie to the punch line will be enthralled by a computer. Anyone who loves letting the mind run its leash will love a computer. A computer can be very patient with its human attendants, no doubt aware of the limitations they are faced with, and can easily become a companion when one is up at three o'clock in the morning looking for something to do, someone to talk with. There are surprises in store at the mere push of a button.

This is justification of the finest cloth; and, if this sounds like a sales pitch, so be it. I regard it more as a tribute. Perhaps in time the veneer will wear a bit thin, but that looks to be down the road quite a way. In the meantime, I'll just sit back and enjoy this touch of futurism, dust and all.

THE VERDICT IS IN

"Odesta has set the standard against which everyone else in this industry will be measured..."

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"It's a textbook tutorial on a disk... a primer on artificial intelligence."
Softalk 3/83

"...a gold-plated edition of a classic."
Apple Dayton Journal 3/83

Chess 7.0 by Larry Atkin

"Chess 7.0 is the definitive chess game available on the Apple and Atari computers... It is certainly the best chess program that I have seen for any microcomputer."
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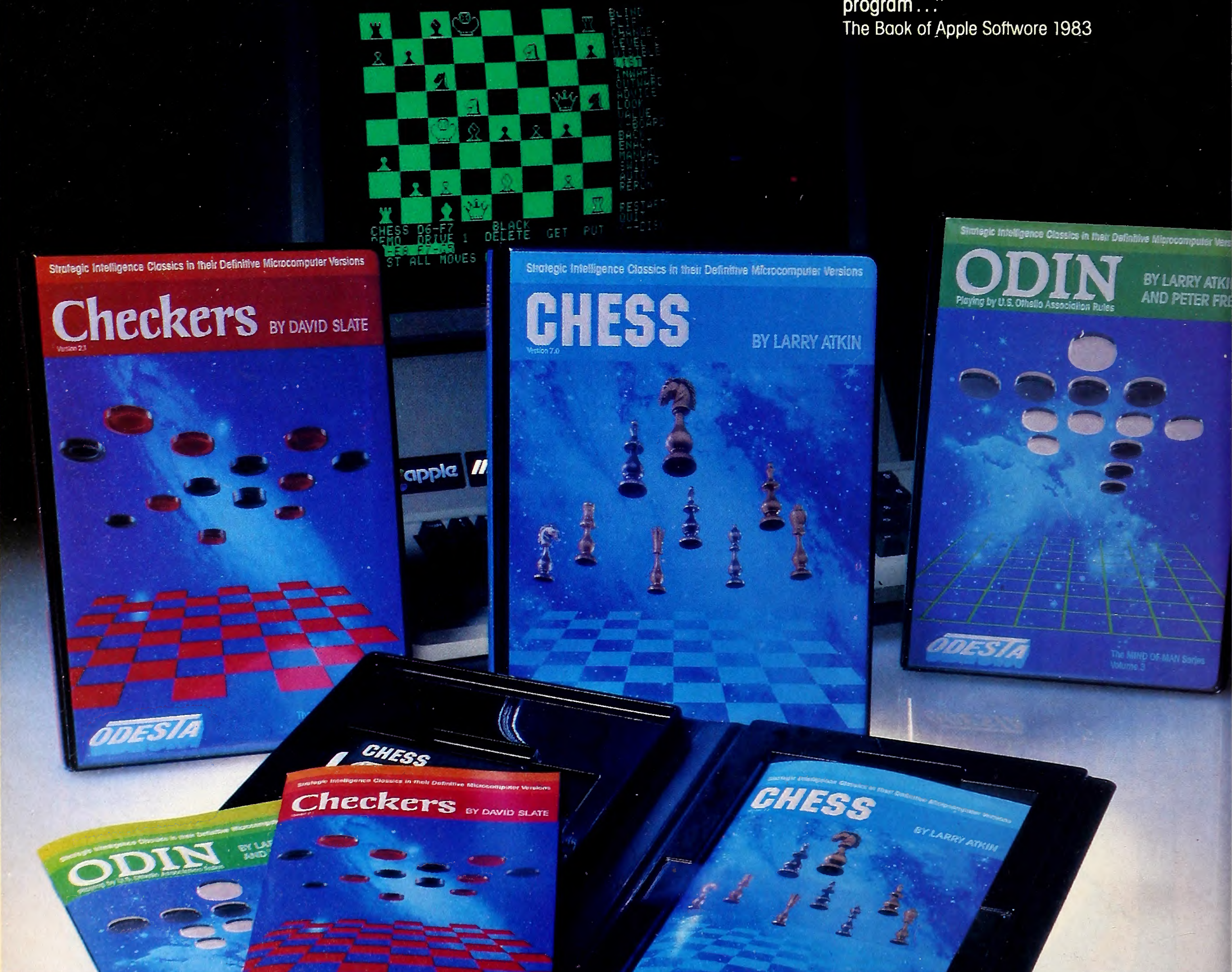
"Odesta has developed a program that not only plays a devastating game of Othello, but also helps you get the hang of it as you go along."
Softalk 11/82

"Odin is the definitive Othello program..."
The Book of Apple Software 1983



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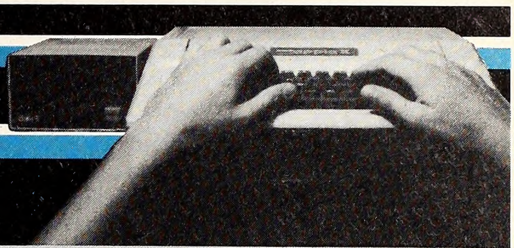

Reviews

Software. The stuff computers thirst for. Whether it's games, business managers, hobbyist utilities, modems and their systems, or home enhancers, you'll find it reviewed and critiqued here. You'll even find some items on hardware. A lot of people read this section to figure out whether they should spend their bucks on something or not. Others read it to oppease their consciences; they've already spent the bucks. Still others read those reviews so they'll have something to disagree with and write to Open Discussion about. A multiuse section, to say the least. Many of us are spending extra hours fiddling with our Apples during these hot August days, and that means we're on the lookout for new goodies to buy. Come September, it's back to business, but, for today, here's the second part of *Softalk*'s annual summer extended reviews section: Marketalk Reviews' Astronomical August Anthology.

Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

The Incredible Jack. In the last few years the microcomputer has revolutionized offices by automating tasks that people once thought could never be automated. Now, with machines facilitating the storage and retrieval of information, making it easier for managers and others to follow, act on, and report trends, it's difficult to be competitive without a computer.

Trouble is, those capabilities are not inherent in the chips of the computer. In most instances, each task is the responsibility of a different program. And the programs—if you want the best word processor, database, spreadsheet, and so on—are by different companies with different ideas of how to make the computer work best. And they're all pretty good ideas, but why should one person have to learn all of them? It's like measuring the temperature of your house in Fahrenheit, setting your oven with the Celsius scale, and checking out the weather in Kelvin. What if you forget which scale is which?

Maybe the best idea is to take one set of good ideas and apply them to all the problems that need solving. That's one of the important concepts behind both Apple's Lisa and the current bestselling program for the IBM pc, *1-2-3*. And it's the main idea behind *The Incredible Jack*. It's designed as a jack-of-all-trades for the Apple.

Unfortunately, if you want the best word processor, the best database, and the best spreadsheet for the Apple, you're still going to have to get three different programs. The jack-of-all-trades can't do any of them as well as a specialist.

It does a pretty good job of mixing the functions, though. And not just by passing data back and forth between three interlinked modules: *Jack* really is all one program. And while it doesn't have all the features of dedicated programs, it integrates many of the important functions beautifully. So once you've learned to write a letter, you know 90 percent of what it takes to create a form letter. Having mastered that, you are close to knowing everything you need to set up a database form. Think of a form letter as a specialized database form with more text. Add calculation on labeled fields to your repertoire and you've become a jack-of-all-trades, with the help of this program and its excellent tutorial.

The manual and the program never use the word *spreadsheet*, by the way. Their term for what *Jack* does is *calc analysis*, but the difference is more one of form than function. The fields used are not lined up in rows and columns unless you choose to set them up that way. They aren't called by row and column coordinates; they use labels instead. Nevertheless, you can do very sophisticated calculations on the values in those fields. Conditional calculations with an if-then-else format are available. Also, calculations can be based on or result in strings. You could set up a form letter, for instance, so that an extra paragraph would be inserted if

the data on the recipient met certain conditions.

The definitions begin to fade into one another with *Jack*. Take a simple business letter. Add a few variable fields to it and it's a form letter. Make a few of those fields calculated and it's halfway to being a spreadsheet. And you're not moving data from an accounting template into the alien environment of a word processor; rather, the word processor file *is* the template. If you have a list of customers in one file, it's simple to pass the data from that file into a form letter file. Just make sure the field names correspond.

Jack-of-all-trades is a good description for this versatile program, but "incredible" may be putting it a bit strongly. One aspect of the program that won't move you to incredulity is the speed. It's written in Pascal, which is pretty quick for a high-level language, but *Jack* may be pushing some of Pascal's limits.

Jack is written to take advantage of the features of the Apple IIe, including lower case, eighty columns, and the new keys, but it also works on a II Plus using control characters for tabs, cursor movement, shift, and shift-lock. There's scarcely a word on hardware compatibility in the manual, but it worked with all the eighty-column cards we tried.

In the final analysis, *The Incredible Jack* won't replace your business software library, but it may find a place in it. There are things it can do with its amalgam of abilities that can't be done, or at least not easily, with any other combination of programs. But because it won't take over your heavy-duty word processing, database management, or financial analysis, it won't eliminate all the different rules you have to learn to get the most out of your Apple. Maybe there's a place for Lisa after all. DD

The Incredible Jack, Business Solutions (60 East Main Street, Kings Park, NY 11754; 516-269-1120). 64K, two disk drives. $179.

General Ledger. It would seem to take a great deal of presumption to call a company State of the Art; with this company, it may simply have taken confidence. The company's first offering is worthy of the name.

General Ledger is one of eight modules of a complete accounting system; it's the heart of the system. It can be used alone or integrated with any of the other modules, such as Accounts Receivable, Sales Invoicing, or Accounts Payable. *General Ledger* uses an accepted double entry accounting system, and one of its special features prevents any input errors by requiring that the daily journal entries be balanced before they can be entered into the permanent files.

The program produces daily, weekly, or monthly reports, including the General Ledger Detail Report, Trial Balance, Income Statement, and Balance Sheet. It provides the control reports necessary to ensure a complete audit trail and requires that a printed copy of all of these reports be made before updating of permanent files can take place. Compared to the hours that might otherwise be spent looking for errors, the tediousness of printing a complete and accurate audit trail is minor and it may well be simply good accounting practice.

The *General Ledger* and the reports it provides are a good, simple nuts-and-bolts system. Its greatest beneficiary is the new computer user who can convert from a manual to a computer accounting system within a couple of hours, not only without a nervous breakdown but with a nice feeling of having entered the computer world with a competent and understanding guide. Experienced computer users benefit from excellent design and easy, efficient use.

The manual is written in a clear, logical, step-by-step format. It explains everything about the program and provides beginning theory and basic information about accounting.

The State of the Art accounting series is perfectly suited to small and medium size companies. Written in p-code and machine-transportable, the system begs to be used with massive Winchester hard disk storage. It does the most incredible data sorts. Even with very large files, requested information arrives on the monitor screen in a fraction of the time you'd expect. All the data inputs are menu-driven and very easy for a company's regular clerical staff to use.

State of the Art's attention to detail is indicative of the thoroughness of the company's approach and its concern for the user. Packaging is not a crucial feature of a product, but State of the Art's is outstanding. The company even provides attractive preprinted labels for the user's backup copies. Now, that is indeed state of the art in customer consideration.

Finally, here is a full microcomputer system for corporate management. SS

General Ledger, State of the Art (3183-A Airway Avenue, Costa Mesa, CA 92626, 714-850-0111). $495.

Lode Runner. By Doug Smith. One hundred fifty unique levels. That's what *Lode Runner* has. With that awesome statistic out in the open, let's get on to the game.

It sounds like crickets on a sultry August evening, but it's not. It's a little person drilling holes in bricks, obstructing pursuers, tunneling to gold. The mourning dove's call is the tiny person jumping, safely, gracefully from any height, from ladders, from platforms, from monkey bars. He's a gymnast extraordinaire, this fellow, but so are his pursuers, the dreaded Bungelings of *Choplifter* fame. The difference is brains: They have few; he has ours.

There's a plot, but it doesn't matter. The object in this running, jumping, climbing, swinging, digging arcade strategy game is to collect all the little gold packets scattered about a brick and aluminum room and climb to a higher room. As levels progress, the gold is placed more and more diabolically. Besides calling on mastery of the arcade skill, each screen is a strategic problem. You won't get far in *Lode Runner* with your mind on hold.

It's a good thing it's from Broderbund. Respect for the player abounds. To wit: When a new screen appears, its action is suspended, to give players a chance to study the new level. Does 150 screens seem impossible with only five men? Give yourself a hundred, or nine hundred, men. And jump to whatever level you like.

The Broderbunders are also known for their fairness. When you use extra men or jump levels, your scores don't count on the game's high score roster.

The graphics are clean and crisp and cute; the animation's charming. But the big achievement is the progression of that multitude of levels. Each builds on the ones before. Each presents a fresh challenge. And, for each difficult problem, there are clues planted in earlier screens. It's an advantage to tackle them in order.

If that were all there were to *Lode Runner*, the game could take its kudos and go straight to the top ten. But there's more. Evidently Doug Smith, Broderbund, and all the friends and relatives of both had such fun creating levels for the game that they decided to let everyone in on the act. Enter the *Lode Runner* game generator.

The editor provides for creating more *Lode Runner* levels—whole disks full. Creating levels with this system is a whole lot easier than mastering them. There isn't a simpler game generator on the market. The hard part, as it should be, is fine-tuning the new screens for playability.

Lode Runner sounds like a summer evening, but it's a game for all seasons. It's enough game for many seasons, too. Look out, *Apple Writer IIe*. MCT

Lode Runner, by Doug Smith, Broderbund Software (1938 Fourth Street, San Rafael, CA 94901; 415-456-6424). $34.95.

Knights of the Desert. By Tactical Design Group. North Africa, World War II. In withering desert heat punctuated by oddly freezing nights, where water was more precious than gasoline, the Axis armies of Mussolini and Hitler sought to sever the British Empire's vital life line—the Suez Canal. The armies were then to sweep victoriously on through Egypt toward the Middle East and its strategic oil fields. In February 1941, Hitler sent two crack divisions to northern Africa under Field Marshal Erwin Rommel. After Mussolini's armies had been humiliated that previous autumn by a patchwork British Army, they were outnumbered almost ten to one. Turning defeat into a stunning series of victories, Hitler's favorite general and the Afrika Korp were soon to make history. The Desert Fox had come to Africa.

Knights of the Desert is a divisional/regimental simulation of the 1941-to-1943 North African campaign. Besides a full twelve-turn campaign scenario, there are five shorter scenarios. The game system is reminiscent of the Tactical Design Group's earlier *Battle for Normandy*. While tactical deployment of military units is a major factor in achieving victory, *Knights of the Desert* is very much a contest of supply and morale. Thanks to the Royal Navy, British forces have virtually limitless supplies. Axis forces must endure the British blockade based on the island of Malta. While generally possessing better morale and equipment, the Ger-

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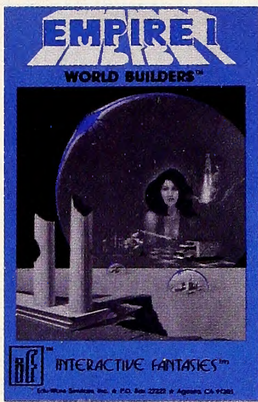

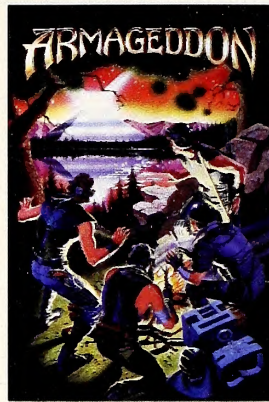

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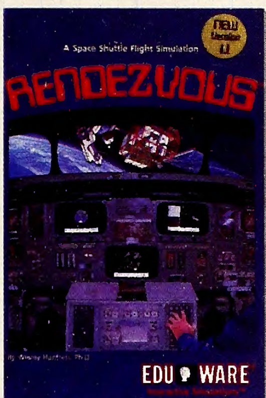

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man forces must race against time and the harsh conditions of desert warfare.

Full-color hi-res graphics depict various British and Axis units and show a portion of the battle area at a time in the now familiar hexagonal grid. Terrain includes strategic towns, rough areas, mountains, impassable desert, and coastal areas. The cursor serves to select units for identification and movement. The battle area screen may be scrolled using the cursor, or an aggregated, hi-res view of the entire North African Theater may be selected.

Unit types include garrisons, infantry, motorized infantry, and tanks. Each individual historic unit is separately rated for morale, actual strength, and maximum strength. One very nice touch is the introduction of standard military symbols to depict unit types, with crosses denoting unit size. During battle, units may be given varying levels of attack intensity and risk, with corresponding levels of risk introduced during battle. Stacking of units in the same hex is allowed.

The game system introduces a new and welcome innovation, the use of multiple-phase turns in which each player has a limited opportunity to react during the opponent's game turn. This offers a far more realistic simulation of the ebb and flow of actual battle than the more rigidly alternating game turns. Air power, while not present in the game as discrete combat units, may be allocated through air points and act as a modifier, influencing the odds of battle between ground forces.

Game play may be halted and saved to disk at the end of each turn. Should you require a capable opponent on short notice, provision has been made for solitaire play, with the computer commanding the British forces.

Game play is relatively quick. Provision has been made to select rapidly all friendly units for movement or battle orders. Unlike in the game system employed in SSI's more sophisticated *Germany 1985*, no provision has been made to order a unit to a specific area or location except to home base and to Tobruk.

Knights of the Desert is a game of quick, slashing movement. Initiative is vital to effect victory. As in the historical campaign, the battle may ebb and flow across the deserts many times before final resolution. For the Axis forces, supply allocation is critical. The amount of supplies successfully running the British blockade will vary according to the historic supply rate prevalent at the time. Secure supply bases must be established by both players to support advancing troops and armor. Combat, movement, and fortifications all consume precious supplies and take their toll as surely as the foe.

SSI lists *Knights of the Desert* as an intermediate-level game. With innovative game play, several minigame scenarios, and options for various skill levels, *Knights of the Desert* is a worthy war game. WHH

Knights of the Desert, by Tactical Design Group, Strategic Simulations (883 Stierlin Road, Building A-200, Mountain View, CA 94043; 415-964-1353). $39.95.

Planetfall. By Steve Meretzky. If you pet Floyd, he snuggles up to you; if you leave him, he runs to catch up, shouting, "Hey, wait for Floyd!" He loves to play, but he'll give his life for you. Incidentally, he's a robot.

Planetfall is a science-fiction text adventure, and it's also a comedy. Lots of the lines and descriptions will make you laugh, but Floyd will only make you smile—and care. Floyd is the star, although the player represents the hero. Floyd puts robots in the same category with children and animals; they're masters at upstaging. You see? He's just upstaged Steve Meretzky's humor.

The story takes place in the 210th century; it begins with the malfunction and explosion of a patrol starship, which our hero survives if you're clever. He lands on a planet that seems deserted. With him, you get to explore a large research complex of a unique civilization that appears to have been cut off suddenly, much like Pompeii, discovering its habits and values and goals. You also discover its troubles and the remarkable way it was dealing with them.

There's plenty to see and to read, and plenty to figure out how to work. There are also some malfunctions to fix; don't be dissuaded if you lack knowledge in electronics or chemistry; you don't need them—just logic.

Except for one of those troubles to which you've fallen heir, there's very little danger in most of *Planetfall*. The need to find a source of food and liquid is your most life-threatening problem until quite near the end. Even then, the dangers come from mistakes, yours and those of the long-gone civilization, not from evil. You won't miss the danger. The delight of a new world and superior puzzles, and, of course, a friend like Floyd, is plenty.

Many of the puzzles are outstanding, although one good one does have the hero running up and down between floors a bit even after the puzzle is essentially solved. The gaming system is Infocom's normal one, superior and ever improving.

But it is the writing, the prose, that merits the most attention. Meretzky is an adventurer, not a seasoned writer, as a few rough spots attest. Overall, the text is rich and colorful and intelligent. As with a fine novel, it takes only the cooperation of your imagination to see every nuance of the setting in close detail and to empathize with the characters.

Perhaps it is those very rough spots that, by contrast, bring to awareness how close well-made adventures are to becoming a legitimate form of literature. While a number of people are struggling to bring literature to the computer via hybrid short stories, interactive fiction, and other new forms with varying degrees of unsuccess, the old adventure, being honed and refined and filled out, is getting there first.

Hey, Floyd, isn't this an exciting time to be alive? MCT

Planetfall, by Steve Meretzky, Infocom (55 Wheeler Street, Cambridge, MA 02138; 617-492-1031). $49.95.

Bookends: The Reference Management System. By Jonathan D. Ashwell. Perhaps Sensible Software puts out relatively few products because it spends a whole lot of time searching for near-perfect programmers. Or maybe the programmers come to Sensible—birds of a feather, and all that—and they and Sensible spend a whole lot of time making the programs perfect before they release them. Whatever, you can rely on Sensible's programs to do what they say they will and do it well and easily.

With *Bookends*, Sensible has outdone itself. Think of every gripe you've ever had about home-use programs—accounting packages, databases, and so on. Don't you wish they wouldn't take ten minutes to sort? Don't you wish they'd let you print *and* sort? If you think of a hundred more wishes, you won't have outthought Jonathan Ashwell; and he fixed them all in *Bookends.*

Bookends apologizes for the length of sorting time it takes if you should ask it to sort a seven-hundred-item file by keyword, where every item can have up to 255 characters' worth of keywords. The maximum time for which it's apologizing? Forty-five seconds. You see, most sorts in *Bookends* take no time, at least not discernibly; you wouldn't have time to press another key in the time most of its sorts take.

First learning to work with *Bookends* is one "But I thought that couldn't be done!" after another. For instance, cinchy editing anytime; if you're looking at it, you can edit it. Getting out of absolutely anything you've gotten yourself into without losing any data or even editing. Searching on scant knowledge—"I know that article was about Janek somebody or other, but I can't remember the rest"; if Janek was in the title, a title search will find the article, and a keyword search will do it otherwise. Printing out any fields in any order on any selection of records, arranged alphabetically instantly by author, title, keyword, or not at all. That's just a few.

There must be a catch, right? There is. *Bookends* is just for people who have a reason to want a file that indexes magazine articles or books, that confines its audience to publishers, engineers, scientists, doctors, lawyers, computer users, students, journalists—just a few esoteric groups. Of course, although Sensible doesn't say so, *Bookends* works just as well for indexing records, movies, and software. So add musicians, stereo collectors, filmmakers, movie fans, and more computer users. It's very limited.

All data goes into *Bookends* in the same form: author, title, journal, volume, pages, date, publisher, keywords, abstract, and classification. (How it comes out is a different matter. Patience.) The lengths of the fields are limited. There's the rub, you say—but only if 255 characters makes you claustrophobic; that's the limit on all but two fields. The classification, which allows you to output different kinds of items in the same list in different formats, is limited to the one character it needs. In the abstract, a description of the work cited, you're allowed 740 characters for your purple prose.

Most fields accept multiple entries. *Softalk*, for instance, has a

strange quirk of using one title for a story on the contents page and another on the story itself. No problem for *Bookends*. We can enter both titles under *title* and choose which we want to use each time we print out. Even if we always print out the same one, someone searching for the rose by another name will find the same flower.

Only the author may have just one entry. AKAs aren't allowed. Not only that, but poor put-upon authors must always be input backward: Bellow, Saul. Or Anderson, Hans Christian. In output, however, single-key responses can result in those inputs appearing as they were or as Anderson, H. C.; Anderson, H C; Anderson, H.C.; Anderson, HC; Saul Bellow; S. Bellow; S Bellow; and, where there are coauthors, Bellow, S., Anderson, H.C., Alcott, L.M.; or Bellow, S., H. C. Anderson, and L. M. Alcott. And a whole bunch more, because you can fool with the commas too.

Seldom does a journal have more than one name. But, especially in technical journals, various bibliographical purposes may call for different forms of the name. *Journal of Social Psychology* may be fine for some listings, but many require *J. Soc. Psych.* The same considerations apply to dates and publishers.

Then there are keywords. These are the heart of the indexing function of *Bookends*, and how well they'll work depends on how intelligently the person who inputs them chooses them. *Bookends* searches for matches beginning with the keyword. For example, searching for *gam* would return everything about games, gambling, and Rita Gam. When keywords include words for all the concepts in an article, then you really have a computerized index. Since you can print out the results of your searches, in any form, you could, if you had a *Bookends* file on *Softalk*, search for keyword *Applesoft*, opt to have the results printed, and end up with a list of every *Softalk* article that can teach you something about Applesoft. (It's coming, it's coming, for heaven's sake!)

Let's get picky. You want to find out about Applesoft, all right, but only if there's a program listing or two to look at. So search for *Applesoft/list*. *Bookends* thinks that's ambiguous of you and asks whether you want all records about Applesoft and all records about list or only records that include both Applesoft and list. Obviously you'd choose the latter or be deluged by reams of listings in Pascal and assembly language and Logo and Business Basic and even Fortran.

Formats are of your own design, and you can make as many as you'll ever use. Through formats, you can print simple lists of authors or titles or full formal bibliographical references. You can print subject lists, showing title and summary; or issue lists, showing everything from just one issue of a magazine. Fastalk could be maintained on, and its manuscript printed directly from, this program. Or you can disdain format and print your listing out just the way you put it in.

Here is where classification comes in. If you have occasion to print up formal reference lists or bibliographies, you may need one format for magazines, another for books, and yet another for authorless volumes in a series (like encyclopedias). By classifying the records consistently according to their type and creating appropriate formats to reflect those types, you can have your list output with each of the records formatted appropriately.

You don't have to print. You can save a selected list to a new file instead; or look at the formatted product on the screen. You can turn your finished file into a text file and take it to your word processor for polishing.

But it's difficult to see why you'd be scurrying to your word processor. *Bookends* is adequate to almost every task. As soon as you boot up, it knows the capacity of your Apple's memory. What it doesn't know, it asks; thus it provides for a lower-case chip and a lower-case keyboard (the instant you specify either of these, your input switches to lower case—right in the middle of the configuration program), a shift-key modification, and a second disk drive. It also has extremely fast editing capabilities that are perfectly adequate for the amount of text involved. Finally, you can configure *Bookends* to your printer; then, if your printer allows, you can manipulate several printer options in your formats—such as turning on or off printer options like italics, alternate typefaces, and underscoring.

There are simple menu-controlled utilities to merge and append files. When your database grows too large to be stored in memory, you simply continue it in a new file. Then you chain the two—all by menu-driven single keystrokes again. The number of files you can chain is unlimited. Chaining allows you to search through all of one file, then load and search through all of any number of other files, all for one search key, and all without retyping that key.

It's difficult to stress enough the ease of using *Bookends*. The manual is clear, concise, and practically unnecessary.

If you have no use for a reference management system, create one; this package is just about worth it. It isn't only that *Bookends* works just the way you've always wished programs would work, it's also the inherent promise that someday soon they all will. MCT

Bookends, by Jonathan D. Ashwell, Sensible Software (6619 Perham Drive, West Bloomfield, MI 48033; 313-399-8877). $124.95.

Early Games Music. By John Paulson. *Early Games Music* isn't a tutorial, and it isn't a music generator. It's an introduction to the tools a child (or anyone) needs in order to learn about music.

The program contains two main parts: One quizzes about notes, their names, and their pitches, while the other lets the child create music. In both modes there's learning.

John Paulson turns the Apple into the almost perfect teacher—patient and forgiving. If you make an error, the program provides audio and visual hints to help you figure out the correct answer.

Though most of the learning is interactive—a game of Simon Says teaches how to play tunes that are already stored on disk—some of it is passive. You can load tunes from disk and listen to them while watching which notes on the keyboard are being played.

Both the quiz and creative (perform and record) segments let the participant experiment almost without limit. Whereas some educational programs will move to another area of learning after the child appears to have mastered a subject, *Early Games Music* stays with it until the *child* feels ready to move on. The same goes for the creative mode; kids can play and play until *they* want to do something else.

Early Games Music is suggested for children four years old to twelve years old. There are worded menus to help select which game to play. There's also a picture menu for tots who can't yet read, but how to use

that menu is not as clear as it could have been. In both cases, adult help is probably needed for the very young. (Besides, programs like this shouldn't be used as a baby sitter, and nothing can match the joy of seeing a child learn.)

In all, the concepts *Early Games Music* teaches are fundamental, and they're taught in an almost subliminal way; children can sometimes learn and not realize they're being taught. There's not a lot of depth or detail in the material, but, for the purpose of the program, that's not necessary. HTV

Early Games Music, by John Paulson, Counterpoint Software (Suite 140, Shelard Plaza North, Minneapolis, MN 55426; 612-544-4720, 800-328-1223). $29.95.

Think Tank. By Dave Winer and John Llewellyn. Whether you're writing a book, planning an ad campaign, making wedding arrangements, or simply trying to set priorities for your Saturday morning errands, it's not likely that your ideas about the subject come to you in a particularly ordered fashion. The process of trying to define, think through, and carry out the many steps involved in a project or task can wind up requiring vast quantities of paper, a huge eraser, and seemingly infinite patience. If you're like most people, your thinking process is idiosyncratic, with ideas coming fast, randomly. Thinking of one thing that must be done, arranged for, or checked into reminds you of another matter that must be taken care of first, and soon it is hard to keep up with yourself.

So you grab a tablet or notebook and think on paper, recording your thoughts as they occur to you and sorting them out later. If you're really serious about getting organized, you recopy your notes neatly onto a clean page once you have everything worked out in your mind. Of course, as soon as you think everything's settled, something that forces a modification or addition to your strategy is almost destined to happen.

Enter *Think Tank*, a program designed to facilitate the thinking, rethinking, organizing, and reorganizing process that's so vital to accomplishing our professional and personal goals. Its authors call *Think Tank* an "idea processor," and that's not a bad way to describe this versatile, unique tool.

Think Tank is essentially an electronic outline generator that attempts to bring to thinking, organizing, and planning what word processing programs brought to writing—flexibility. This powerful, well prompted program allows you to generate, organize, and refine your thoughts and ideas in outline form on screen. And then, because it's electronic, capable of erasing without leaving a mark, it gives you limitless permission to change your mind. Because this program allows you to, in effect, process your ideas, it just may help you get more out of your thinking.

Creating a *Think Tank* outline is easy. You just start putting your ideas down on paper, or rather, on screen. Ideas can be expressed either as single lines of text, known as headlines, or as paragraphs, which can be just over two thousand characters in length. Both headlines and paragraphs can be indented to appear on screen (and on paper) at any of many different indentation levels, depending on the degree of importance or priority you want to assign to them.

So does this mean that you have to be the type of person who thinks in outline form—you know, one of those people who arranges the grocery list into neat little categories? Hardly. The great thing about this program is that it helps you let your ideas flow freely, because you know that you can organize them later. Before you know it, ideas become heads, expansions of those ideas become paragraphs, the paragraphs generate subideas that become subheads, the subheads . . . well, you get the picture. And it's a snap to modify your electronic outline whenever you have another idea, a change of heart, or new information to keep track of.

Think Tank divides the screen into a large window for text and a small command area. If your Apple is capable of displaying eighty columns, either naturally or via Videx, the window takes advantage of it. The text window is where you express your thoughts, in a single line or in paragraph form. By indenting an entry a lot or a little, you assign it a certain level of priority or importance in relation to the others.

Once you've entered a headline or paragraph, you may edit it, add to it, move it around to change its status, and so on. So when you're trying to define a problem, work out the details of a plan, or nail down a strategy, you don't have to think about the form your ideas take—all you have to do is think. As your ideas take shape and multiply themselves, you can insert the new ones anywhere and at any level you like within your outline, delete old ideas that no longer seem important, and so on. You can also indent or outdent whole groups of headlines in one stroke, browse through the outline, search and replace to find or alter entries, and print out all or part of any outline.

All these things are accomplished by means of straightforward, logically named commands arranged in four command menus. The menu for whichever section you're in is constantly displayed across the bottom of the screen. Each of the command menus in this tree-structured program relates to the next. When you position the cursor over a command, an explanation appears on screen to remind you what the command does.

Two especially useful capabilities this program offers are *expand* and *contract*. The expand command permits you to see all the various headlines underneath a major one, thereby allowing you to focus in on the details of a particular segment of the outline. The contract command can be used to contract the outline so that only major headings show up on screen; this allows you to get a feeling for the larger picture.

Also noteworthy are special command modes that allow you to enter or edit lots of headlines and paragraphs without having to return to the main menus each time.

Written in Pascal, *Think Tank* uses the Pascal editor to allow you to edit your headlines and paragraphs. It's also possible to "port" an outline into a word processor for editing with a Pascal-based word processor by making the outline into a Pascal text file. (Of course, you can also port an outline back into *Think Tank*.) Lately, users have been asking the makers of the program for a way of translating *Think Tank* outlines into DOS text files for use with word processors like *Apple Writer II* and *ScreenWriter II*. The version of the program that is being shipped now incorporates this utility and owners of the previous version may request the utility from the company.

Think Tank is not a perfect program. It is not as fast as you might wish (disk access slows things down some), the paragraph limit of 2,048

characters may occasionally frustrate you, and its logic may not always directly match yours. *Think Tank*'s main drawback, however, concerns not the software but the hardware. A more extensive setup—two disk drives and a language card are required, printer (and Videx eighty-column card for Apple II owners) is very much recommended—than some Apple owners have or can afford is called for. It's quite understandable that a program such as this would require a full system, but it's also too bad. *Think Tank* would seem to be a natural for use in schools by both teachers and students, but unfortunately many schools lack the necessary equipment.

The spiral-bound *Think Tank* manual, written by John Unger Zussman with assistance from David Greene, is a gem. Its creators are telling the truth when they claim the book is written in "clear, readable, nontechnical English." It's very refreshing. The manual is packed with thoughtfully arranged, helpful information, including a tutorial to acquaint new users with the program, notes and suggestions for experienced users, an excellent glossary, and well presented technical information. Finally, it contains a reference guide section that describes the *Think Tank* command structure and each individual command in clear detail. A helpful command reference card is also part of the package.

It would be silly to think that *Think Tank* will ever supplant those lists we're all so fond of making. There's something so satisfying about sharpening up a brand new pencil and heading a clean, invitingly blank sheet of paper with the words "to do"; it fills a real need. Nor will *Think Tank* do away with index cards, notebooks, and other time-honored ways of keeping track of information. What the program just may do, however, is help you organize and take better advantage of all those great ideas you have. JEV

Think Tank, by Dave Winer and Jonathan Llewellyn, Living Video Text (450 San Antonio Road, Suite 56, Palo Alto, CA 94306; 415-857-0511). Two disk drives. III, 96K; IIe, 64K; II, 64K. Apple II or IIe hard disk users: Apple Pascal software package is required. $150.

Interstellar Sharks. By David Mullich. *Interstellar Sharks* is the second in Edu-Ware's Empire Trilogy of fantasy role-playing games. The initial frontier explorations are over and an empirical government binds the colonies together. With that civilizing force has come the bane of societies, bureaucracy. Everywhere there are palms to be greased, rules to be bent, and red tape to be cut. To survive and prosper in this constraining environment requires the temperament of a shark: ruthless and willing to take chances.

In fact, if this is a game with a message, the message is clear: Red tape makes laws ineffective and polarizes people and their government. Players assume the personas of businessmen, diplomats, or spaceship pilots. Each role has broad possibilities—the strongest suit of the Empire games is the latitude given the player in character development.

Businessmen work for major Imperial monopolies. They can play the stock exchange or apply for trading seats on the commodities market. Periodically, their companies assign them important work around the colonies—negotiating labor disputes, arranging trade agreements, even engaging in industrial sabotage.

Diplomats receive missions from their embassies. Often they are entrusted with carrying diplomatic pouches between colonies.

Pilots take on the most difficult task: outfitting spacecraft. Some of the supplies are hard to locate, and pilots must visit all the colonies to find the equipment they need.

There are eleven planets connected by the trade routes. The game begins at a space station, where new characters are generated and old characters are placed in cryogenic sleep between games. The eventual goal of the game is to figure out how to reach the Imperial planet Triskelion. That planet is surrounded by an enormous force field. Each of the other nine planets is unique and full of surprises and challenges.

Passage between planets becomes bogged down in red tape. Managing to obtain a passport and ticket and then clear customs is an adventure in bureaucratic dawdling.

Winning the game without doing anything illegal takes a very long time. The case against bureaucracy is most strongly made in the rewarding of ingenuity in the breaking of laws and customs. Illegal markets and weapons flourish everywhere. Pilots can make fortunes in drug running. With insight, Mullich shows how much of living becomes a gamble when normal actions are rendered illegal. For example, players carrying illegal contraband can't pass through customs; they must depend on a lucky dice roll to escape. This section of the game is suspenseful and exciting.

When you're caught in illegal actions, you may opt to bribe the police, negotiate your release, or attempt an escape. Failing these, you can shoot it out with the law.

The *Interstellar Sharks* vocabulary is extensive for this kind of game, with one hundred eighty words. Colorful hi-res graphics enhance, but they don't vary much from planet to planet. Included with the game is an unusual booklet, "The Memoirs of Yoram Lazur," penned by Wendy Peterson. It provides a history of the period between the first game of the trilogy and this one. Although the writings of Twelfth Empress Yoram Lazur sometimes read like James Joyce, they do clarify the game's sociopolitical environment.

Interstellar Sharks plays considerably better than the first game in the series. However, be prepared to spend an enormous amount of time developing each character. Psychologically, *Interstellar Sharks* wears a player down fast. The sheer weight of the simulated red tape and procedural hindrances slows the game down to a crawl just when you feel like soaring. Still, if you persevere to the end, you'll feel a real sense of accomplishment—rare in computer games but common to Edu-Ware's products. RRA

Interstellar Sharks, by David Mullich, Interactive Fantasies, Edu-Ware Services (Box 22222, Agoura, CA 91301; 213-706-0661). $32.95.

Taxan RGB vision-I. Apple's detractors have been saying for years that you can't do professional computing in forty columns, while Apple's proponents have pointed out the wealth of software that won't run on any other machine. Now you can have your cake and eat it too. The introduction of the Apple IIe marks the first time in Apple history that eighty-column boards for the Apple are standardized, inexpensive, and widespread. Because of this, software that uses the eighty-column display is popping up all over the place.

Which raises another dilemma: How do you display those eighty columns clearly and still have a color display without buying two monitors? An RGB monitor (a high-resolution monitor with a special interface that handles the signals for the three primary colors of light—red, green, and blue—with separate signals) will do the trick. But it's never been easy to run an eighty-column video signal into an RGB interface card.

TSK Electronics offers a simple and moderately priced solution. They offer the RGB vision-I with a choice of interfaces (for the IIe only) that combine eighty-column and RGB signal generation on a single card, to be inserted in the auxiliary slot.

The monitor can be used with a II Plus as well, but it isn't as simple to install nor does it offer eighty columns on the same board. There is nothing in the installation instructions covering connecting the RGB board for the II Plus to an eighty-column card. With some cards it may not be possible. This isn't really a criticism of the Taxan product: It's a common problem with RGBs and eighty-column boards on the II Plus.

The situation on the IIe is considerably simpler. The RGB vision-I can be installed in the IIe using the 410-80 or the 410-64 interface. These cards provide the same eighty-column options as Apple's two eighty-column cards for the IIe; one gives eighty-column display using Apple's built-in firmware, so it's compatible with programs written for Apple's card, and the other is the same thing with an additional 64K of RAM, again controlled by Apple's built-in firmware. Both cards also act as an RGB interface, and they cost marginally more than the equivalent cards from Apple.

The monitor itself is light and portable, though it has no handle, with a screen that is about eleven inches measured diagonally. In graphics mode the colors are clear and bright; in text mode, in forty or eighty columns, the characters are highly readable. Most of the abilities of the monitor are determined by the interface card used.

With either the II Plus or the IIe, the color of the text displayed onscreen can be set with a switch on the interface card. This feature gives the RGB the capability of emulating your favorite color monochrome monitor—green, blue, amber, and white on a black background are the options on the IIe. The II Plus version includes those options plus yellow on black, as well as three foreground/background color combinations, all hardware-selectable.

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The monitor-interface combination for the IIe has some added features that aren't available on the II Plus. For instance, in forty columns, each character position on-screen can be set to have a different foreground and background color. There are sixteen possible colors available for both foreground and background, and they're software-selectable. Although there is no commercially written software that takes advantage of this feature, there is a great potential for customizing your own programs to color-code distinct functional sections of the screen.

Other options available only for the IIe include a medium graphics mode with a resolution of 80 by 48 in sixteen colors and a very odd hi-res that is 80 by 192 in sixteen colors. The regular hi-res mode can be done in sixteen colors by setting foreground/background colors in the same way they are set for the text screen. The resulting colored areas, being based on text screen character positions, are necessarily somewhat blocky. With the interface that has the extra memory, double-hi-res-graphics mode—560 by 192 in monochrome or 140 by 192 in sixteen colors—is also possible. Again, no commercial software uses these options, but an astute programmer could figure out enough from the included demos to use them in custom-made programs.

For Apple II Plus owners, the Taxan RGB vision-I is a good color monitor, but it may not be the best for the money. For Apple IIe owners, it's a great way to get eighty-column display and color graphics too. DD

Taxan RGB vision-I, TSK Electronics (18005 Cortney Court, City of Industry, CA 91748; 213-810-1291). $399. 410-80 interface, $199. 410-64 interface, $349.95.

Close Assault. By National Microcomputer Associates. All the great battles of history are the sum of countless individual battles fought by exhausted and often frightened men. Their battlefields are abandoned farmhouses, waving fields of wheat, or barren hilltops. Generals don't fight battles; soldiers do. They live, fight, and sometimes die in that most basic of military units, the squad. With *Close Assault*, you can experience all the challenge and thrill of squad-level command. *Close Assault* is not a simulation of a particular historic battle but rather a simulation of squad-level tactics played out in a generalized European village.

Most innovative in *Close Assault* is the player's role in the scenario. The character of one of the squad leaders is reserved for the player—you actually take part in the fray. Should your character die or be critically wounded in combat, your faithful computer will assume command and finish the game for you.

Close Assault is a simulation of tactical infantry combat in World War II, using a unique hybrid game system that combines the best advantages of pure computer simulations with traditional board games.

The game may be either two-player or solitaire, with the computer able to play either side or both. Russian, German, and American squads are represented, rated according to their historic firepower, weapons range, and morale. Squad leaders are rated for morale and leadership.

Two separate standard scenarios are available: harassment of advance, a dogged defense by outnumbered defenders; and strong point attack, the clash of opposing squads in classic combat. In addition, players may custom-design their own scenarios, establishing goals and determining victory conditions. During play, the computer resolves tactical combat and determines line-of-sight conditions—what a squad is able to see from its vantage point. Factors such as elevation, forests, wheat fields, buildings, and smoke can all obstruct vision from one map hex to another. Any attempt of a squad to fire on another squad that is not in line of sight is effectively blocked.

Besides all this, the computer handles double hidden movement. It determines if and when a unit on the move has revealed itself and whether enemy units have been revealed. During combat, the computer effectively records the changing status of every man in the conflict.

Both fire combat and close assault reflect short and bloody hand-to-hand combat. Weapons allowed include rifles, machine guns, demolition charges, smoke grenades, and flame throwers. As in real life, weapons may malfunction in action and require repair.

Squads are initially placed at assigned locations. Players are informed of the presence and locations of enemy units as they are sighted. Because it's necessary, with the hybrid systems, to verify the map board, the computer frequently confirms current unit locations. Squads may engage in long-range fire, hand-to-hand combat, and may move. There's even a provision for a squad to go berserk. The computer will wrest control of the squad from the player and attack the enemy without regard for its own safety!

Close Assault's graphics and sound are handled in a simple and straightforward manner. There are none. In this hybrid game, the disk comes with a high-quality multicolored mapboard, more than sixty unit counters, and a note pad for recording the ebb and flow of battle. The designer has opted for the visual impact and simplicity of a mapboard and counters combined with the computer's game administration and solitaire-play capability. In the process, the overhead usually taken up by memory-hungry graphics is used to create a highly capable computer opponent that can offer the most experienced gamer a serious challenge.

Playing *Close Assault* is reminiscent of playing Avalon Hill's board game *Squad Leader.* While the computer game is somewhat simpler than the board version (artillery and mortar fire are assumed to have taken place before the game begins, for example), the feel is similar. In *Close Assault*, because there's no graphics display of unit movement, game commands are considerably simpler to learn and, praise be, easier to remember.

Close Assault represents a refreshing change in computer war gaming. The hybrid system offers an interesting alternative to pure computer simulations, and the level of play and sophistication of *Close Assault* make it a first-rate entry into the war game arena. WHH

Close Assault, by National Microcomputer Associates, Avalon Hill (4517 Harford Road, Baltimore, MD 21214; 301-254-5300). $35.

Maze Craze Construction Set. By Eric Hammond. It's hard to look at this program without comparing it to the *Pinball Construction Set*. First, its name is almost the same. Second, cursor control in constructing mazes feels the same. There's nothing wrong with that; who would complain about having a program likened to the works of Bill Budge?

That's where the similarities end, but it's not where the *Maze Craze Construction Set* ends.

You can buy *Maze Craze* just to play the games included in it. There are ten different mazes and ten games that use various combinations of the ten mazes. Game A, for instance, uses maze 1 and no others. Game J,

on the other hand, uses some of the more difficult mazes combined with the more difficult game parameters (monsters know where you are, no power dots, and so on). But the reason you buy *Maze Craze* is to create maze games of your own.

The whole program is menu-driven. You don't have to know any programming or any commands; all options are selected by joystick or keyboard. The maze editor lets you modify any of the existing mazes or create your own from scratch. Energizers (no more than four), tunnels, and bonus characters are yours for the positioning. When you're done creating your maze, your next task is to lay down all the dots. This is one option Hammond gives us that adds new variation to an old theme; you don't have to fill the entire maze with dots. Glory hounds can reach level 200 in no time by putting just a few dots in the maze.

Several other editing modes let you combine mazes into different games, customize and create your own monsters and protagonists, and vary the intelligence of monsters (to wander aimlessly or tail you to your eventual demise). In case you're the type who gets killed in these games and always mutters, "No fair! He didn't get me!" *Maze Craze* lets you vary the collision detection (merciful to sensitive).

Finally, disk options allow you to save and load parameters of games you've created. Absent-minded gamesters will savor the option that lets them format a disk from within the program in case they haven't done so before spending hours creating games.

As for color, *Maze Craze* has several, none of which you're allowed to choose. Oh, you can select the color you want the walls to be, but it's a choice between royal blue and institution green. Everything else comes with a preassigned uniform.

Saving your game creations is similar to saving adventure games in progress; you can't save the games—just their parameters. The drawback to this is that, unlike the *Pinball Construction Set* or *Genesis*, you can't create games to market or even to give to your friends. To play your games, you have to have the program disk. Data Trek's intention for *Maze Craze* is obviously for purchasers' enjoyment only.

So where do we stand in the genre of do-it-yourself utilities? Thus far we have one in each: arcade shoot-'em-ups, pinball games, adventures, and now maze games. *Maze Craze* offers more than enough good features to offset its few limitations (limitations that would irk only the pickiest of game designers).

Don't expect to be thrilled with *Maze Craze* unless you're a maze fan to begin with. If you are, and you're tired of always playing on someone else's turf, this is a grand opportunity to have the home field advantage. Go for it. HTV

Maze Craze Construction Set, by Eric Hammond, Data Trek (121 West E Street, Encinitas, CA 92024; 619-436-5055). $39.95.

MegaWriter. You can't get something for nothing; any good you receive is obtained at the sacrifice of something else. When we talk about software, it shouldn't be that way, but it often is.

In its ad and on its manual, *MegaWriter* compares itself with *Apple Writer* and *Apple Writer II*. For each feature listed, all the yeses in the *MegaWriter* column are matched in the *Apple Writer* column by noes or "with additional such and such only."

They're not lying. *MegaWriter* does have a lot of features not found in *Apple Writer*. That's on paper. In use, it's a different story. Just looking at spec sheets won't tell you how a car feels when you drive it; you have to take it out on the road.

The biggest draw is all the wonderful features *MegaWriter* gives you for an attractively low price. You get the same powerful functions found in other word processors that are in the hundred to two hundred dollar range (find, replace, mail list merge, text block move, eighty-column display with or without an eighty-column card, underline, and boldface), all for less than what *Bank Street Writer* costs.

It's a powerful word processor, that's for sure. But there are a few catches.

First, *MegaWriter* is written in Pascal, which means several things. It means you have to have 64K RAM. It means the Pascal text files you create won't be compatible with most other word processors. It means you can send your files by modem only by using terminal programs that handle Pascal files.

Second, you have the option to use it with one or two disk drives. If you have only one drive, you can expect to do lots of switching between program and data disks. *MegaWriter* is menu-driven, but most menu selections require the program disk to be in the drive.

Third, you can have an eighty-column display even if you don't have an eighty-column card. The catch is that, unlike *Magic Window*, which scrolls the text horizontally like a typewriter carriage so you can see what you're typing, *MegaWriter* takes your cursor to the other half of the page where you can't see it. You're still typing, all right; you just can't see a thing unless you hit a special control character that flips to the other half of the screen.

The p-System and the program take up a lot of memory, so your text files will be limited to six or seven pages in length. You can link files together when you print, but it's still a bit troublesome when you're trying to edit a document that is saved on disk as three or four segments.

One nice thing IIe users have is an automatic shift-key modification that works just like a shift key on a typewriter. Those who have II Pluses, however, will have to hassle with the dreaded "type control-W first and then the desired letter." If you've grown accustomed to hitting the escape key to get upper case, unlearn that habit fast; hitting escape destroys whatever you've created since you last saved.

When you look at each feature in isolation, this is a rather good program; the pluses are strong, the minuses are small. It has almost everything you'd want in a word processor. Everything appears on-screen just as it will appear in printed form; the manual is clearly written; it's menu-driven so you don't have to memorize any confusing commands; and it's affordable.

MegaWriter will work fine on a standard II Plus setup. But to get the most out of the program, make sure you try it out and use it on an Apple IIe with an eighty-column card, a monitor with good resolution, and two disk drives. Anything less will only produce frustration. MTV

MegaWriter, Megahaus (5703 Oberlin Drive, San Diego, CA 92037; 619-450-1230). $59.95.

Lady Tut. By Greggy. And now, the maze game as French farce. The spirit of Georges Feydeau looms over *Lady Tut*, a frenetic, door-slamming little arcader that adds a new twist to one of the oldest formats in the business, making it sufficiently novel to be a pleasant way to pass the time.

The maze is the maze the maze has always been, though here it's demarcated by classy colored marble walls, befitting the pyramid of the Girl Queen whose sarcophagus is your ultimate goal. The wrinkle is that as you scramble toward the little treasures in the crannies of each maze and are sought in turn by the unsavory guardians of same, you have access to numerous revolving sections of the maze walls (all clearly identifiable as such, fortunately), which pivot smoothly when you run into them, closing behind you and shutting out any pursuing menaces—though you may possibly be exposed to more in the adjacent corridor if your entry was ill timed. Thus, you are constantly entering and exiting, and you have some say as to how the maze shall be laid out from moment to moment and what paths your traditionally blind and blundering pursuers will take.

After two or three mazes, you stumble upon a gun (actually, it looks like a diamond ring, but the screen flashes the word *GUN!* at you, anticipating your misperception). Instantly, you realize why all your points have been scored as "shots," and they take on the practical function of ammunition. Whether this is an entirely good thing is a matter of taste. It seems a hardly sporting turn of events, although the corridors do get awfully crowded right about here. . . . Still, subtlety suffers as your score improves. What was heretofore a light-footed game of complex high-tech hide-and-seek becomes pretty much a straight-ahead, clenched-teeth, blast to victory.

After you've gotten through the nine different mazes (each not necessarily more difficult, just different) and found your mummy, you aren't going to see anything new, though at the end of the game you get a nifty graphic reward. But the power to control and alter the character of each maze and make it work as an ally should fascinate the younger set long after the game is first successfully completed. AC

Lady Tut, by Greggy, California Pacific (757 Russell Boulevard, Davis, CA 95616; 916-756-2921). $29.95.

TAC. By Ralph H. Bosson. *TAC* superbly simulates tactical armored combat in World War II. The setting is a wooded plain somewhere in Europe. If you use a little imagination, it could be the road to Berlin in 1945. Three T34 tanks, the backbone of the Red Army, have just rounded a wood on the edge of a small plain. Suddenly, high explosive shells begin to fall, their bright orange firebursts indicating the presence of the enemy somewhere at the far edge of the clearing. Controlling the T34s, the player orders a recoilless rifle team and field artillery into the woods to cover the tanks. The player is in the tank in the lead when three Tiger tanks appear. You swivel your turret toward the target bearing. . . .

Players in *TAC* choose military units from four nationalities, German, Russian, British, and American, by means of a unique purchase routine. Each unit has its own point value. Forty armored vehicles and assorted infantry and field artillery, meticulously modeled within the simulation, are available to equip the mixed forces. Each vehicle is individually rated for speed, firepower, and armor thickness—front, sides, and rear.

During game play vehicles may be maneuvered and their weapons trained on enemy forces. Infantry and field guns may be loaded for transportation or unloaded for action. Unlike in some simulations, the mechanics of movement and deployment of forces in *TAC* is not so time-consuming as to detract from the tactical nuances of the game. *TAC* is just plain fun to play.

So detailed is the simulation that calculations for antitank fire involve armor thickness, slope of armor, range of fire, and relative positions of the combatants. It's a nasty shock to learn that your Sherman tank shells merely bounce off a German Tiger tank's frontal armor. In several of the five scenarios, provisions are made for antitank mines, smoke, and improved positions.

Graphics and sound effects are first-rate. Both tactical and strategic views of the battlefield are available with detailed hi-res representations of individual tank types on-screen. The attention to detail is awe-inspiring. When a tank fires, look closely and you'll see the muzzle flash. As vehicles move, there are appropriate sound effects. From the rattle of ma-

chine-gun fire to the bright orange shellbursts, the audio and visual components add considerable realism.

As *TAC* is played solely with the computer, no game cards are necessary. To assist in tracking target identity and location, a record pad showing a representation of the strategic screen is provided.

A unique feature is special combat. Under certain special circumstances, the computer initiates combat; armored units automatically change course to overrun dismounted infantry units; and dismounted infantry units attack vehicles.

In summary, *TAC* is a superb entry from Avalon Hill. It is a carefully researched and designed game of impressive sophistication, yet it's surprisingly easy to play and even a little addicting. WHH

TAC, by Ralph H. Bosson, Avalon Hill (4517 Harford Road, Baltimore, MD 21214; 301-254-5300). $40.

Learning About Numbers: Volume 1. By Richard Cornelius and Carol Clark. *Learning About Numbers: Volume 1,* the second program in C & C Software's Kids' Corner line, introduces preschool and primary-grade children to counting, telling time, and simple addition, subtraction, multiplication, and division. The disk contains four separate instructional programs: Let's Count, Let's Tell Time, Arithmetic Fun 1, and Arithmetic Fun 2, each with nine skill levels. The levels, by the way, are not evident to the user.

Let's Count presents up to twelve familiar objects, such as chairs, sailboats, butterflies, hammers, hearts, mugs, and television sets, to be counted. To answer, the child presses the number on the keyboard that corresponds to the number of objects displayed. In this program and in the ones that follow, correct answers are reinforced with one of an endless assortment of winking happy faces and a musical tone. If a child is unable to answer successfully after two tries, the program offers help, in the form of a demonstration of one-to-one correspondence, the concept that is at the heart of counting.

At level one of Let's Count, only one, two, or three objects are presented. By level five, eight to twelve objects appear. At level six, a small group of objects, surrounded by a box, is displayed. Once the objects have been counted, a plus sign appears, followed by a second box of objects to be counted. Next, a third box of objects appears. Connecting the third box to the first two is an equals sign; and with that, counting problems have gently metamorphosed into addition problems. By the time kids reach level nine, they are dealing with random numbers of objects, as few as one or as many as nine, in each of the boxes.

In the first five levels of Let's Tell Time, a conventional clock with an hour and minute hand and all twelve numbers is shown alongside a digital watch. The learner's task is to read the time shown on the digital watch and then use the arrow keys to move the clock hands to reflect the time shown on the watch. At level five, the numbers 3, 6, 9, and 12 are displayed on the clock face, and the digital watch disappears for good after that. From level 6 on, the time to which the clock must be set is conveyed in words and expressions that the child is bound to encounter in the real world.

Like the other sections of this program, both parts of Arithmetic Fun have nine levels of increasing difficulty.

Both arithmetic sections incorporate a simple story as an added motivation to young children. The story has three main characters—a prince or princess, a wicked troll who is pursuing the royal child, and a hero or heroine (which the child controls), who can choose between rescuing the character in distress or helping the troll. Solving math problems moves the story along. The arithmetic sections can be modified to run in "learn arithmetic facts" mode. In that mode, each of the nine levels presents problems that involve the number of the level—all the problems on level four contain the number 4, and so on. It's easy to switch back and forth between this setup and the normal one.

Like its predecessor *Magic Crayon*, *Learning About Numbers* offers a delightfully straightforward educational management system. This system allows interested parents and teachers to adapt the program for use with children at various levels of experience and ability and to keep records of up to fifty children's performances. Access to programs can be specified and controlled for individual children or groups of children, as can the level on which particular programs begin (the entry level) and the level a child is asked to achieve but not go beyond (the target level). The management system also allows an adult to turn score-keeping and time-keeping features on or off; to examine or print score information for one or many learners; to turn on, limit, or turn off sound; and to turn on or eliminate graphic reinforcement.

Learning About Numbers is flexible, thoughtfully organized, and easy to use. Instructions that preview the programs are available on disk, as is an on-screen tutorial to acquaint users with the setup and symbols that Kids' Corner software consistently employs. In addition, help is available at any time.

The graphics are simple but pleasing. They don't compare to the cartoony animated images featured in Xerox's *Sticky Bear Numbers* counting program—which covers only counting—but they do add visual interest to the program.

The well-written manual strikes just the right balance between brevity and detail. Besides explaining how to use the programs and the management system, it specifies the educational objectives of the programs and the skills children need to use the various parts and levels of the program. JEY

Learning About Numbers: Volume 1, by Richard Cornelius and Carol Clark, C & C Software (5713 Kentford Circle, Wichita, KS 67220; 316-683-6056). $40.

Printographer. By Stephen Billard. One would think that the makers of printers with graphics capabilities would include programs with their printers to facilitate using those capabilities. Alas, because the printer people market their products for use with many different computers, in most cases you are left to your own devices.

The most common use for a printer's graphics capability is to print pictures from the hi-res screen. This process, called a hi-res screen dump, is actually fairly simple. In fact, it can often be handled by a surprisingly short routine to translate data that the video signal understands to data that the printer understands.

So printer dump programs costing enough to make them worth marketing had better do a darn sight more than just dump pictures. And they do. Typically, they work on a number of different printers. Since there isn't any standard way that printers handle graphics, most programs include several different routines to cover all the popular graphics printers. That goes a long way toward making the programmer's job proportionate to the royalties paid for the program, but, as most people have only one printer, only one of those routines is going to be of any use to the individual customer.

So printer dump programs typically offer such features as picture scaling, picture cropping before printing, and inverse and normal printing modes. (Sometimes what is white on the screen should be black on paper; sometimes not.) And that is where most graphics dump packages stop.

Stephen Billard has thoroughly earned his royalties; *Printographer* does all that and goes quite a few steps farther. For instance, it can save pictures in a compressed format that will conserve from ten to twenty sectors of disk space per picture. It does smart disk catalogs, listing only those files that contain hi-res pictures, whether they're in a compressed format or a normal binary file. In addition to the handling of standard horizontal and vertical cropping, *Printographer* can crop pictures to diamond or cameo shapes prior to printing.

Finally, if you want to be able to print pictures and save or load compressed pictures from your own programs, the routines in *Printographer* are transportable. They can be copied to your own disk and loaded into any free space in memory. Then, with a call command followed by the parameters for scale, cropping, and so on, your program can perform most of the functions of *Printographer*. If you have Southwestern Data Systems's *Routine Machine*, adding the *Printographer* routines to your programs is even easier.

Printographer is one of the best printer dump programs available today. With all its extra features, it's a good alternative to the more expensive graphics printer cards as well. DD

Printographer, by Stephen Billard, Southwestern Data Systems (10761-E Woodside Avenue, Santee, CA 92071; 619-562-3670). $49.95.

Planetmaster. By Gary Cuba. Ever want to control your own planet? Not politically, but ecologically. There's a lot more to it than just situating animals in places where they can eat in peace and not get killed by other animals. Lots more to it.

Planetmaster lets you discover the complexities of raising various species in a somewhat controlled environment. It also challenges you to see how many ways you can twist, stretch, and contort your brain while doing so.

The story is simple. It's the year 2323, and you're in charge of administering ecological sanctuaries for frail and endangered species. That's as far as the simple part goes.

The sanctuary is actually a twelve-sided life-supporting satellite. From a virtually unlimited number of species, you select six that you want to take care of on the satellite. Here's where it gets challenging. Some are plant eaters, some are meat eaters, and some are both; however, you don't know which are which until you've made your species selection.

Taking care of your animals requires that you keep track of just a few things: vegetation growth, temperature, rainfall, seasonal changes, climates, animals' balanced diets, demographics, food consumption, hibernation periods, birth and death rates, and life spans. There's more information to deal with than any normal human can possibly keep track of without the help of a pencil and a few reams of paper.

After thoroughly analyzing all the information, you herd species from zone to zone, seeking the zone that provides the optimum environment for each species. Each turn constitutes one season; there are four seasons to a year.

In the beginning of the game, you're allowed to choose a difficulty level from among five—ranging from novice planet tender to planetmaster—and the number of years you want to play. At the end of the game you're given an efficiency rating. Not a lot of reward for the tribulations you go through.

The only graphics in the game are hi-res drawings of each species during the selection process, a map of the satellite, and some bar graphs. The rest of the screens are comparison charts and efficiency listings. It doesn't sound like an exciting game, but don't be fooled. The feeling you get when you see that your herbivores in zone five doubled their population last year will warm you all over, while you'll pound the computer in anger as a flashing message tells you that half your omnivores in zone eleven were lost to starvation.

As time marches on, you'll get to know each species, feeling sorry for them when their favorite flora becomes harder to find or when some of them are gobbled up by neighboring carnivores.

For a long time, the thinking person's games were largely put out by Strategic Simulations, Epyx/Automated Simulations, Odesta, and other giants. Magnetic Harvest's *Planetmaster* isn't nearly as colorful, commercially attractive, or complexly programmed (it's written in Applesoft), but it's just as thought-provoking and intricately designed. HTV

Planetmaster, by Gary Cuba, Magnetic Harvest (Box 255, Hopkins, SC 29061; 803-783-3151). $24.95.

Jump Jet. By Chuck Benton. Get the Sunday afternoon gamers outta here. Send 'em back to the arcades to watch cute little cartoon penguins waddle around darling, colorful, picturesque backgrounds. Buncha wimps. Give 'em an adventure or something where they can sit and think for ten minutes about what key they're gonna press. They can forget about this. Gimme a beer and set it up again.

This is *Jump Jet*. The graphics are from the minimalist school of arcade art. The sound is like something you'd get from a tired Mixmaster. It's just you, a joystick, and your sweaty palms. But it's the right stuff.

You are flying your Harrier jet off an aircraft carrier, attempting to keep your eight-ship convoy and carrier intact long enough to get to the enemy land base and knock out the missile silos. First you must deal with rocket-firing, torpedo-spitting cruisers—in waves of two, three, and four. Then you confront slippery rocket-firing subs—two, three, and four. The kamikaze planes—one at a time, thank God (but hey, how about those plucky World War II vets going up against the most technologically advanced fighter-bomber in the world?).

Sound simple? You bet. Is it simple? No way. The first time you play this game is very likely to be the last. It plays by its own rules, which don't include any of the laws of gravity or aerodynamics. You are not likely to complete a successful refueling from the flying tanker without first crashing into it at least four times in succession. Ditto trying to dispatch even the first wave of torpedo boats without flying right into a missile. Or trying to get close enough to the subs to bomb them faster than they can submerge. And yet, for all these trials, there is a way to triumph, and should you but learn the way, you'll surely enter into computer-game heaven and sleep the sleep of the just. And boy will your thumbs be tired.

Don't get the wrong idea: Almost none of the popular criteria for a good game apply to *Jump Jet*. The animation—such as it is—flickers like a silent movie running too slowly. The plane's being of the vertical take-off and landing variety was a gimmick obviously chosen to spare the programmer the hassle of trying to simulate anything remotely resembling the operation of a normal aircraft. You are not allowed to bomb when you are near or over your convoy, which means you're forced to lose most of the torpedo races. The only strategy that has a hope of working against the missile bases is dumb luck and lots of ammo. There's no pause key. And the sound effects (no sound-off option) will teach even the most hardware-disinclined where the speaker wire connection is located on their Apple (motherboard, extreme lower right corner).

It's a sullen, sloppy, mean-spirited, bruising, working-class game. It knocks you around and gets drunk and frightens the children. It's hell to live with. But you just can't leave it. Not after all you've been through together. AC

Jump Jet, by Chuck Benton, Avant-Garde (Box 30160, Eugene, OR 97403; 503-345-3043). $29.95.

Plasmania. By David Lubar and Lewis Geer. Sirius is getting nostalgic.

Remember the movie *Fantastic Voyage*, in which scientists and their submarine were shrunk to microscopic size and injected into a dying patient's bloodstream to save him? That concept is central to this game.

Remember games in which you shot at things as the scenery scrolled by, and then when you completed the level you did it all over again? And again and again? That's here, too.

Sirius can't be serious with this game. When compared to its own *Repton, Wavy Navy*, or even *Lemmings*, *Plasmania* is a step backward. A big one.

Plasmania is the Apple version of an Atari 800 version of an Atari VCS game. That should give you an idea of its simplicity.

But what's really going on here? Is *Plasmania* based on the general plot of *Fantastic Voyage*, or did designer Dave Lubar come up with a piece of programming and decide to fit the plot around it? In the former case, the game has missed an excellent opportunity to take an intriguing plot and turn it into an equally intriguing game. Synergistic took the idea and came out with the educational adventure *Microbe*. Turning out an arcade-type game containing some of *Microbe*'s scientific detail could possibly have made *Plasmania* a seller, instead of destined for the cellar.

Sirius is better than this, Lubar is better than this, and they both know it. Let's hope it shows in the future. MTV

Plasmania, by David Lubar and Lewis Geer, Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195). $34.95.

Jury Trial. By Vic Ratner. Few of the millions who watched Perry Mason regularly tie defense attorney Hamilton Burger in knots haven't envisioned themselves in fantasy as the slick lawyer for the defense. *Jury Trial* gives weekend attorneys a chance to try their luck in court without jeopardizing the lives of innocent people.

A strategy game all in text, *Jury Trial* emphasizes the concentration skills of the players. It's definitely not a game to be played solo; six is the ideal cast, providing a player for each role: defense attorney, prosecutor, and two witnesses for each side.

As the first attempt at a computer courtroom game, *Jury Trial* scores points. It gets a few more as a change of pace. That's about it. The strategy comes in selecting a jury and examining witnesses; everything else is a memory test. The jurors range from bigots to bleeding hearts; each attorney gets to challenge a couple in an attempt to stack the jury favorably toward his client's cause.

Once the jury is in place, the trial begins. Well, no, first the facts of the case are presented—flashed at high speed in random locations on the monitor. Items as detailed as the make, model, year, color, and seven-digit license number of the defendant's car are nearly impossible to pick up. Yet the entire trial and outcome rest on the witnesses' ability to answer questions about these facts truthfully.

What a good idea a game simulating a jury trial is! How we look forward to seeing one that lives up to the promise in the idea. Maybe even a later version of this one. LXB

Jury Trial, by Vic Ratner, Navic Software (Box 14727, North Palm Beach, FL 33408; 305-627-4132). $29.

Money Manager. By Alan R. Chap and David A. Sidewater. The purpose of a simulation program is to let you practice some activity—typically a risky or hazardous one, such as flying an airplane—without the usual penalty for making mistakes. Once you have learned to do all the right things in various situations on the simulator, you will have a much better chance of surviving the experience in reality.

Most of us will never have to pilot an airplane, but we all have to manage money; and you know the old line about mistakes being expensive. It would be helpful if growing persons could get some practice in this activity before their survival depends on it.

Money Manager is described by the publisher as "an ideal instructional tool for a life skills course" and is recommended for junior and senior high school students and adults; but that's not quite right. For one thing, the program is a little young for some of that audience; and, for another, there's a younger audience that would love it as a game.

Try this program on an elementary or secondary school student; or, better yet, try competing on it for a high score with such a student—and watch out for surprises! The kid is going to take it more seriously than you do and will probably soon learn to beat you at it. The designers of *Money Manager* may have been trying for a classroom tool for adults, but they have incidentally produced a fascinating strategy game for children.

The program simulates an eight-week period of financial activity for an adult head-of-household. In that role, you get paid every two weeks, and you have to deal with expenses like weekly food bills and monthly mortgage payments. There are unexpected expenses, such as medical bills; but there are unexpected surprises as well—selling a manuscript or a painting, for example.

You start the period with $1,000—$500 in savings, $250 in a checking account, and $250 in cash. You have opportunities to buy various things (such as a bicycle, a couch, or a computer), and, if you get a good price, that adds to your points. You can also sell these things (at a loss, of course) if you need money suddenly.

You have many decisions to make during the simulation. You can buy insurance: The premium has to be paid every week, but if (for example) a fire should destroy all your possessions, they will be replaced at no cost. You also have to decide how much cash to carry. If you don't have enough, you miss out on the occasional 20-percent-off, cash-only sale at the store; but if you carry too much, it really hurts when you lose your wallet.

There are a lot of random events in this simulation—just as there are in reality.

No simulation program can teach you to make wise decisions; only reality can do that. But a good simulation can teach you to recognize the traps before you put your foot in them. *Money Manager* costs as much as a five-dollar allowance for six weeks—and what it teaches will probably be worth a lot more. JR

Money Manager, by Alan R. Chap and David A. Sidewater, Computer Age Education (Box 6227, Washington, DC 20015). $29.95.

Dino Eggs. By David Schroeder.

"I believe I already know what I want, but let's have a look at the menu anyway, Antoine."

"Oui, m'sieu."

"Any preferences, Mariette?"

"Wow, Henry, I don't know any of these. Why don't you order for us?"

"Very well. We'll have the Hard Hat Maccaciatora and the Miner Flambe, with a side of Choplift aux Crevettes. Bring us two bottles of Chateau Wolfenstein '81, and Baked Aztec for dessert."

"Oui, m'sieu. But if m'sieu will permit, may I recommend the Dino Eggs*?"*

"Dino Eggs?"

"Ah, oui; it is our latest arcade delicacy."

"Oh yes, I see it here . . . in with the language card—that's a bit steep, Antoine."

"But worth it, m'sieu. Succulent baby dinosaurs, in the shell or just out, are packed into flaky subterranean layers. As a time-traveling scientist, you warp in to gather them up and send them back to your time for preservation, while taking care not to contaminate them. The whole is exotically seasoned with just the right touch of danger in the form of prehistoric spiders roaming the caves, whose touch can eventually mutate and devolve you. As a major ingredient, one large maternal brontosaurus, lightly steamed, may deposit her foot upon your head at any moment. This is exquisitely counterbalanced by the building of fires to hold her at bay—all carefully timed to ensure maximum suspense while you complete your task."

"Why, Antoine, that sounds absolutely extraordinary."

"Indeed, m'sieu; Chef Schroeder's unique signature is recognizable in every byte, just as in his Crisis Mountain *creation. This is, however, his piece de resistance, and, as such, truly resembles nothing else."*

"Delightful. Leave the disk in the drive, will you?"

"Oui. And for you, madame?"

"Oh, just a light snack attack. I'll have little bits of his."

"Very well, madame."

"Gee, Henry, how exciting!"

"Yes indeed, Mariette. And afterward, what say we stroll over to Flippers for some frozen yogurt and a giant cookie?"

"Love it." AC

Dino Eggs, by David Schroeder, Micro Lab (2699 Skokie Valley Road, Highland Park, IL 60035; 312-433-7550). $40.


D.Winkler '83

TWA Phone Home!

How Travel Planning by Modem Can Work for You

BY JOANN LEVY

"I want you both at that meeting in Boston a week from Monday. Eleven o'clock sharp."

"Right, J.D.," replies Mr. Notwithit, who hurries off to his office to jot a note to his secretary to make travel arrangements for him on Monday.

"Right, J.D.," says Ms. Withit, glancing at her watch. The Baltimore traffic isn't too bad, and she's home about six. The standard rates are in effect for both services—five dollars an hour for CompuServe time, plus twenty-one dollars an hour for OAG time.

She logs on to the information service and at the prompt types: Go OAG 200. Her screen responds:

```
OAGEE          PAGE OAG-200

REQUEST RECORDED, ONE MOMENT, PLEASE
CONNECTED TO 120AG

WELCOME TO THE OFFICIAL AIRLINE GUIDE (OAG),
COPYRIGHT 1983, OFFICIAL AIRLINE GUIDES,
INC., OAK BROOK, ILLINOIS 60521

OAG NEWS LAST UPDATED 1 JULY

PRESS ENTER KEY FOR IMPORTANT NEWS, OR
ENTER /I, /F, /S, /M
```

She types the short-cut request for schedules from Baltimore to Boston:

```
/S Baltimore;Boston 22 Jul
```

She could have entered /S to respond to menu queries, but entering the departure city, a semicolon, destination city, and date takes her directly to the daily airline schedule. The screen displays:

```
            DIRECT FLIGHTS              FRI-22 JUL
FROM-BALTIMORE,MD,USA
# TO-BOSTON,MA,USA
NO EARLIER DIRECT FLIGHT SERVICE
1   710A  BWI   818A  BOS  AL 350  D9S  B  0
2   735A  BWI   843A  BOS  DL 266  72S  B  0
3   810A  BWI   913A  BOS  PI 316  73S  B  0
4  1100A  BWI  1208P  BOS  DL 130  72S  S  0
5  1215P  BWI   126P  BOS  AL 214  B11  S  0
6   120P  BWI   231P  BOS  AL 270  B11  S  0
ENTER +,CX,X#,F#,RS             (#=LINE NUMBER)
```

The flight on line 3 would get her to Boston in time for the meeting but would mean being at the airport for an 8:10 a.m. departure. She hates early-morning flights and thus enters the + command to scroll through more flights.

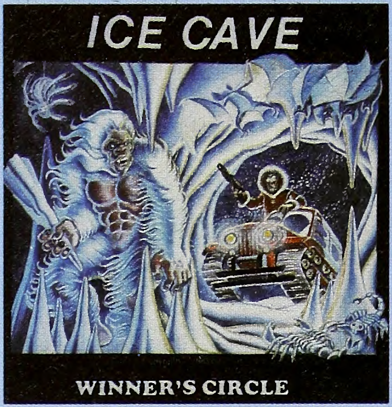
```
            DIRECT FLIGHTS              FRI-22 JUL
FROM-BALTIMORE,MD,USA
# TO-BOSTON,MA,USA
1   430P  BWI   541P  BOS  AL 240  B11  S  0
2   655P  BWI   804P  BOS  DL1622  D9S  S  0
3   805P  BWI   913P  BOS  AL  48  D9S     0
4   815P  BWI   918P  BOS  PI 484  73S     0
 NO LATER DIRECT FLIGHT SERVICE
ENTER + FOR CONNECTIONS
ENTER -,O,CX,X#,F#,RS           (#=LINE NUMBER)
```

Why not take that flight on line 1 next Friday? She could be in Boston in time for dinner with her sister and spend the weekend at Cape Cod. To see the fares for that flight, she enters F1, the fare request for line 1.

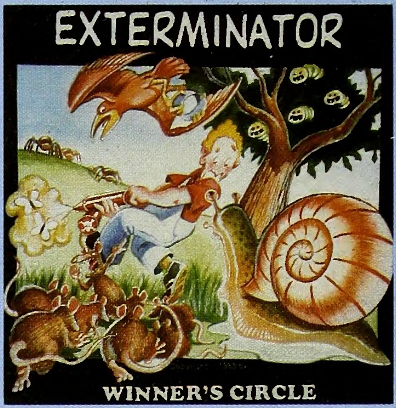
```
FARES IN US DOLLARS                      FRI-22 JUL
SELECTED FOR BWI-AL 240 BOS

#  ONE-WAY   RND-TRP   ARLN/CLASS    FARECODE
```

APPLE POTENTIAL REALIZED

ENTER THE WINNER'S CIRCLE

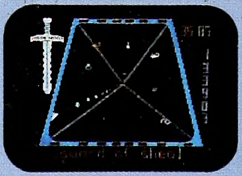


Ice Cave™

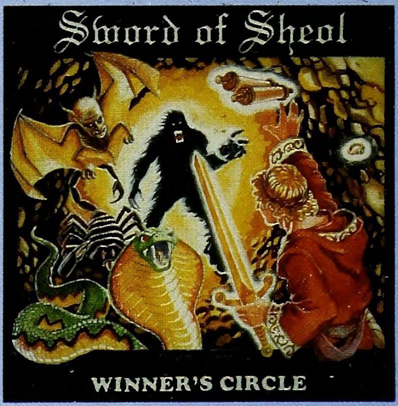


Exterminator™

Sanitron™



Sword of Sheol™



You may not have realized it, but Apples have vast, untapped potential. Game software from Winner's Circle taps it ALL.

Stunning 3-D graphics (the kind that just stand still in some games) are combined with advanced, HIGH SPEED ANIMATION routines for Dazzling, "LIVING PICTURE" action. And the game play has some teeth in it. ALL THE CHALLENGE YOU AND YOUR APPLE CAN HANDLE.

Available in disk for $29.95. At your dealer. OR ORDER DIRECT. Send a check, or your VISA or MASTERCARD number. Include $2.00 shipping and handling. California residents add 6½% sales tax.

Apple is a registered trademark of Apple Computers, Inc.

WINNER'S CIRCLE
2420 Parker Street, Berkeley, CA 94704

```
 NO LOWER FARES IN CATEGORY
1*                 88.00      AL/B        BE70X67
2*                 88.00      AL/B        BE70Z67
3*                199.00      AL/B        BE77
4        109.00   218.00      AL/M        M
5        136.00   272.00      AL/Y        Y
 NO HIGHER FARES IN CATEGORY
 * ENTER L# TO VIEW LIMITATIONS
ENTER L#,X#,S,RS                     (#=LINE NUMBER)
```

Despite all the publicity about airline deregulation, she's still amazed at the range of fares for a one-hour round-trip flight, $88 to $272. The asterisk tells her there are limitations for the lower fares but, who knows, maybe she can qualify for the $88 fare. She types L1 to view the limitations for the flight on line 1.

```
BWI-BOS AL  CLASS B                FRI-22 JUL
   88.00 US DOLLARS              ROUND-TRIP
LIMITATIONS FOR FARE CODE BE70X67

FARE DESCRIPTION: ADVANCE PURCHASE
 EXCURSION FARES
BOOKING CODE: B.

FARE IS ONLY AVAILABLE FOR TRAVEL FROM
 MON THRU FRI.

MINIMUM STAY REQUIRED IS 1 SUNDAY.
MAXIMUM STAY ALLOWED IS 60 DAYS.

PURCHASE TICKET FOR TRAVEL NO LATER
 THAN 7 DAYS BEFORE DEPARTURE.
 * END OF LIMITATIONS DISPLAY *
ENTER F TO RETURN TO FARE DISPLAY
ENTER S TO RETURN TO SCHEDULE DISPLAY
```

Ms. Withit types /Q to quit the OAG, logs off CompuServe, contacts her travel agent to make a reservation, and calls her sister.

This particular scenario is fictitious—except for the OAG information. But one is tempted to finish the story.

Ms. Withit enjoys a weekend at Cape Cod, arriving relaxed at the eleven o'clock meeting. She smugly submits her $88 expense voucher to J.D., having enjoyed a weekend trip with flight paid for by the company. Mr. Notwithit submits an expense voucher for $218, the only fare available when his secretary and the travel agent finally stopped calling each other.

This is just one example of why you should learn to use the OAG; there are as many others as there are flights and passengers.

The electronic edition of the Official Airline Guide database contains approximately seven hundred thousand flight schedules for six hundred fifty airlines serving one hundred five thousand city pairs. It is available through direct subscription, CompuServe, and various other connection services. The database contains schedules for all direct flights and thousands of connecting flights operating throughout the world, and although international fare information currently is unavailable, plans are to provide it sometime next year. Fare information is provided for all direct flights and connections in North America.

Unlocking the Code. Using the OAG is relatively simple, once you're accustomed to reading the fairly cryptic codes. Let's take a moment to figure them out. Look at the first example again:

```
             DIRECT FLIGHTS              FRI-22 JUL
FROM-BALTIMORE,MD,USA
# TO-BOSTON,MA,USA
NO EARLIER DIRECT FLIGHT SERVICE
1   710A  BWI   818A  BOS  AL 350  D9S  B  0
2   735A  BWI   843A  BOS  DL 266  72S  B  0
3   810A  BWI   913A  BOS  PI 316  73S  B  0
4  1100A  BWI  1208P  BOS  DL 130  72S  S  0
5  1215P  BWI   126P  BOS  AL 214  B11  S  0
6   120P  BWI   231P  BOS  AL 270  B11  S  0
```

The first column is the line number. You use that to request additional information about that specific flight. The next column is departure time (local), then departure airport. BWI is Baltimore. If you don't recognize the airport designation, you can query it with a preceding '?' and the OAG will identify it for you. The fourth column is arrival time (local) for the destination in the fifth column. The sixth column is the airline—Delta, Piedmont, and so forth—followed by the flight number. The eighth column is the equipment—L1011, DC-10, 727, or whatever. The ninth column lists the meal served: B, L, D, S—breakfast, lunch, dinner, or snack. The final column is the number of stops en route. If you're looking for a nonstop flight on a direct flight schedule, check this column for a zero.

You can access either schedules or fares directly and switch back and forth between them. Our fictitious scenario demonstrated a schedule access. You can use the same "formula" to call up fare information. Suppose you wanted the cheapest fare between Los Angeles and Boston on July 23. After accessing the OAG, you would type:

```
/F LAX; Boston 23 Jul
```

You can use full city names, airport designations, or combinations of the two. The display accessed by the above request is:

```
                  FARE MENU
FARES FOR                          FARES FOR
DIRECT FLIGHTS                DIRECT FLIGHTS
AND CONNECTIONS                         ONLY
---                                      ---
1   COACH CLASS AND EQUIVALENT FARES       6
2   FIRST CLASS AND EQUIVALENT FARES       7
3   BOTH COACH AND FIRST CLASS FARES       8
4   ADVANCE-PURCH AND EXCURSION FARES      9
5          ALL OF THE ABOVE FARES         10

PLEASE ENTER A NUMBER
```

For the sake of the example, we're interested in all fares for direct flights only, so we enter 10.

```
FARES IN US DOLLARS                      SAT-23 JUL
SELECTED FOR LAX-BOS

#  ONE-WAY   RND-TRP   ARLN/CLASS    FARECODE
 NO LOWER FARES IN CATEGORY
1*            298.00      NW/B        BE77
2*            318.00      AA/B        BE77
3*            318.00      CO/M        ME77K
4*            318.00      TW/B        BHE77
5*            318.00      UA/B        BE77
6*            378.00      NW/B        BE77O
7*            379.00      NW/B        BE70
8*            398.00      CO/M        ME77
 * ENTER L# TO VIEW LIMITATIONS
ENTER +,L#,X#,S#,R#,M,RF(#=LINE NUMBER)
```

The message in the heading tells us there is no lower fare than that on line 1 and the asterisk signals limitations. To see what they are, we type L1.

```
LAX-BOS NW CLASS B              SAT-23 JUL
  298.00 US DOLLARS            ROUND-TRIP
LIMITATIONS FOR FARE CODE BE77

FARE DESCRIPTION: ADVANCE PURCHASE
 EXCURSION FARES
BOOKING CODE: B.

MINIMUM STAY REOUIRED IS 7 DAYS.
MAXIMUM STAY ALLOWED IS 14 DAYS.

PURCHASE TICKET FOR TRAVEL NO LATER
 THAN 7 DAYS BEFORE DEPARTURE.
 * END OF LIMITATIONS DISPLAY *
ENTER S TO VIEW SELECTED NW SCHEDULES
ENTER F TO RETURN TO FARES DISPLAY
```

Since we're going to Boston for a convention and a few days' recreation, we can meet the minimum stay and other requirements. Now we want to see what the schedule is for this fare. If you think it's the infamous "red-eye," you're wrong. We enter S.

```
           DIRECT FLIGHTS            SAT-23 JUL
SELECTED FROM NW FARE DISPLAY
FROM-LOS ANGELES,CA,USA
# TO-BOSTON,MA,USA
 NO EARLIER DIRECT FLIGHT SERVICE
1  1100A  LAX  835P  BOS  NW 166  D10  L  1
 NO LATER DIRECT FLIGHT SERVICE
ENTER R FOR RETURN NW SCHEDULES
ENTER X#,L,R,F,RF               (#=LINE NUMBER)
```

To expand the code into plain English, we type X and the line number, 1.

```
  EXPANDED DIRECT FLIGHT DISPLAY
LEAVE-     11:00A      ON-23 JUL
FROM-LOS ANGELES,CA,USA
NORTHWEST ORIENT AIRLINES FLIGHT 166
AIRCRAFT-MCDONNELL DOUGLAS DC10
CLASS-FIRST/COACH/ECONOMY
MEAL-LUNCH/DINNER
ARRIVE-  8:35P        ON-23 JUL
AT-BOSTON,MA,USA
ELAPSED TRAVEL TIME      6H 35M

ENTER S TO RETURN TO SCHEDULES
ENTER F FOR SELECTED FARES
```

Do-It-Yourself Specials. Why not just let your travel agent look it up? There are good reasons, one of which is that by doing it yourself you know for sure you've got the cheapest flight, the agent doesn't have to call you back and ask if an eleven o'clock departure is okay, you don't have to discuss it with your spouse and then call the agent, and so on. And there are numerous possibilities your travel agent has no interest in telling you about and you have no way of asking about.

Let's see what we get when we look at connections. From the last display, we type S to return to schedules and then type CX.

```
              CONNECTIONS                 SAT-23 JUL
FROM-LOS ANGELES,CA,USA
# TO-BOSTON,MA,USA
1  1000A  LAX    242P   DFW  DL1140   L10   L   0
    342P  DFW    810P   BOS  DL 824   767   D   0
2  1000A  LAX    603P   JFK  AA  40   747   L   0
    915P  JFK   1014P   BOS  AA 118   72S       0
3  1005A  LAX    334P   STL  TW  78   707   L   0
    430P  STL    800P   BOS  TW 150   72S   D   0

ENTER +,−,DF,X#,F#,RS              (#=LINE NUMBER)
```

The flights on lines 1 and 3 aren't too appealing. You have no interest in spending an hour in the Dallas—Fort Worth Airport, or in Saint Louis. But the flight on line 2 goes to JFK. Isn't that the other New York airport? You're unsure, so you type: ? JFK.

```
     *RESPONSE TO YOUR HELP REQUEST*
JFK=
     NEW YORK,NY,USA/J.F. KENNEDY
```

Good. Now, the American Airlines flight on line 2 gets into JFK at 6:03 p.m. and requires a plane change for the connection to Boston. However, you have good friends in New York who'd love to meet you at the airport for dinner and your stopover of three hours would permit a nice visit. You get into Boston at 10:14 p.m. instead of 8:35 p.m. and the flight costs twenty dollars extra. But maybe it's worth it to you. The point is, only you know whether you can take advantage of various schedules. When you ask travel agents for the cheapest flight to Boston, they aren't going to ask if you'd like to spend another twenty dollars and have dinner in New York.

See the USA. The possibilities for creative scheduling are limitless when you have access to all the schedules and fares yourself. Suppose you see an ad for a cheapie flight to Houston. You may not want to go to Houston, but perhaps you can launch yourself inexpensively from there to a destination you favor. Or suppose you take a direct flight from Los Angeles to Chicago for business that concludes on a Friday and you don't need to be back to L.A. until Monday. Where might you spend the weekend? Just call up the connecting schedules for flights from Chicago to Los Angeles and find out.

Using OAG's commands to see connecting flights, fares, and so on is quick and simple. Each display, as you can see from the examples, includes the menu options available from that particular display.

Also, you can get a narrative explanation of the commands, at CompuServe rates (no surcharge), by typing Go OAG and selecting the appropriate menu option. Further, there's an OAG Help Desk with a toll-free number: (800) 323-4000.

Yes, there's a surcharge for using the OAG. As mentioned in the opening scenario, the standard rate (after 6:00 p.m. and on weekends) is twenty-one dollars an hour, plus the standard CompuServe service rate. Prime time (weekdays, 8:00 a.m. to 6:00 p.m.) charges are thirty-two dollars an hour, on top of the information service prime rates. Using the OAG through CompuServe during prime time works out to about ninety cents a minute; standard time at about forty-five cents a minute. Our Ms. Withit might have spent a couple of dollars for the few frames of information she required. On the other hand, she saved her department's travel budget more than a hundred dollars. That's a pretty good return on an investment of two bucks.

If you expect to use the service frequently, you may be interested in a direct subscription, rather than accessing through CompuServe. There's a one-time charge of fifty dollars and usage is billed in units, with a unit equal to ten cents for one minute; additionally, every schedule screen display costs two units, every fare display three.

Better than Kansas City. OAG fares are updated daily, schedules weekly. Approximately one hundred fifty airlines worldwide have direct access to the OAG database and update their own schedules and fare information continuously. British Airways, for example, has terminals in both New York and London with the capability of inputting to the database in real-time mode.

OAG, a wholly owned subsidiary of Dun and Bradstreet, processes new information constantly at its headquarters in Oak Brook, Illinois. Although the database is down between 4:30 and 5:00 a.m. Central Time for updating, according to Dave Shaffer, OAG's senior vice president of electronic publishing, "updating only takes about five minutes."

Shaffer is one of the forty to fifty of OAG's employees "dedicated" to the electronic edition. The design of the electronic edition, which has been under development for the past three years, was not, says Shaffer, to have a separate division; almost all nine hundred OAG employees have input and responsibility.

The print edition of the OAG dates from 1929, when the company was founded, but the electronic edition has been on-line only since May 1. Its prototype ran until February and certain design features are still being incorporated, such as randomization of competing airlines with identical schedules and/or fares. You won't always see American Airlines preceding United.

You, Me, and ITT. Who uses the OAG? Of the one hundred ten thousand subscribers (anticipated at two hundred thousand by September)—three thousand direct subscribers plus those who access through various database services—65 percent are business accounts. Only 35 percent are travel agents and airlines. The friendly OAG EE was designed for the untrained, unknowledgeable user, not for the travel professional.

In addition to friendliness, there's a "fair deal" for the traveler that was previously unavailable. Even if your travel agent wants to secure you the cheapest flight, it may not be possible. Ninety percent of the agents use automated systems, it's true, but most are provided by a sponsoring airline. The implications are fairly apparent.

You do, of course, still need an agent for availability information and booking. But at least when it comes to fares and schedules you've got a choice. Lots of choices. *All* the choices.

Bon voyage!

OAG sample displays reproduced with permission, courtesy Official Airline Guides, Oak Brook, IL 60521.

Enhance your Apple* with 10 extra K; 15 spare disk sectors; two-way scrolling for catalogs & listings; triple-speed disk access; new commands like ELSE, SWAP and TYPE; and 2 tons of slick, unprotected programming enhancements.

*APPLE IS A REGISTERED TRADE MARK OF YOU-KNOW-WHO.

BEAGLE BASIC

APPLESOFT ENHANCER
by MARK SIMONSEN

Requires Apple IIe (or II/II+ with RAM Card)—

Normally, Applesoft is unchangeable. What you see is what you get. But BEAGLE BASIC puts Applesoft into RAM, letting you customize and enhance it. The following functions may be added at ZERO COST IN MEMORY—

RENAME ANY COMMAND or Error Message. You can literally *re-write* Applesoft with new commands. For program protection, encryption, or even foreign translation! Even the *new commands* that follow are re-nameable:

ELSE: Common in many programming languages, but missing from Applesoft until now. ELSE follows If-Then statements, like this—
IF X=2 THEN PRINT "Yes": ELSE PRINT "No"

SWAP: Normally, to swap two variable values, you need a 3rd variable & an extra split-second. **SWAP X,Y** exchanges values in *one quick step.*

TONE: Beagle Basic's **TONE P, L command** plays a note of Pitch P, Length L. It's simple—no messy Pokes or Calls are ever necessary.

HSCRN: If you have ever used Lo-Res's SCRN command, you'll appreciate **HSCRN X,Y** for finding the off/on status of any hi-res dot.

TXT2: Allows Text Page 2 to act like Page 1, for printing, listing, etc. Switching pages opens up *all kinds* of programming possibilities.

MIX, PAGE, RESL and MODE: No more awkward graphics screen-switch pokes. For example, type **PAGE1** or **PAGE2** to switch pages, instead of POKE -16300,0 or POKE -16299,0 (*never* look-up those darn Pokes again!).

GOTO & GOSUB may now be followed by variables. Use English-like commands such as "GOSUB COUNTER" or "GOTO SONG", where COUNTER and SONG have been assigned line-number values. "GOTO 3+X", etc., legal too.

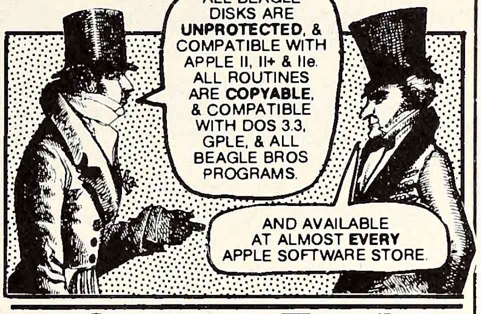
ESCAPE-CURSOR: Normally, you can't tell if you are in Escape Mode (moving the cursor). With Beagle Basic, hitting ESC temporarily changes the normal cursor to a flashing "+".

BETTER BEEP: Select one-of-many more pleasing tones for Apple's control-G Bell.

PLUS: Bonus Screen Formatter & Editor, new 1-word commands to replace awkward Apple text Calls, new commands to scroll text up *and down*, not possible before Beagle Basic. And...

INVERSE REM STATEMENTS Too: Makes REM-statements appear as bold stand-out headlines in your Applesoft listings.

BEAGLE BASIC $34.95
Requires standard Apple IIe (or Apple II or II+ with RAM Card). Includes Peeks & Pokes Chart and Apple Tip Book #6.



DOUBLE-TAKE

2-WAY-SCROLL / MULTIPLE UTILITY
by MARK SIMONSEN

A hundred times a day, you type "CATALOG" and "LIST", and the appropriate data dutifully appears on your monitor... then promptly scrolls off the top of the screen into Hyper-Space. If the information you are looking for goes by, you must *List* or *Catalog again* to find it.

Double-Take has a solution—

2-WAY-SCROLLING

List programs and Catalog disks with the added ability to CHANGE SCROLL-DIRECTION using the Apple Arrow Keys. Your monitor becomes a "Search Window" to be moved UP AND DOWN through Catalogs and Listings at will.

IMPROVED LIST-FORMAT:* (optional)

Each program statement is listed on a new line for easy tracing of program flow, and efficient, *FAST* de-bugging.

Commands are properly-spaced (1-space between words, not two) and much easier to follow. Printer listings, in any width, are supported too.

BOTH NORMAL & IMPROVED LIST-FORMAT (shown here) SCROLL UP *AND* DOWN.

```
10   HOME
   : POKE 230,64
   : CALL 62450
   : HGR2
   : HCOLOR= 3
20   FOR C = 3 TO 4
   : HCOLOR= C
   : FOR X = 64 TO 96
   : POKE 230,X
   : HPLOT 0,0 TO 279,191
   : HPLOT 279,0 TO 0,191
30   FOR B = 0 TO 1
   : S = PEEK (49200)
   : NEXT B
   : NEXT X
   : NEXT C
   : TEXT
```

SCROLLS BOTH WAYS

*Similar to Utility City's XLISTER, but Bi-Directional at Machine-Language speed. For-Next's are not indented, as in Xlister.

MONITOR-LISTINGS feature 2-Way-Scroll too. Disassemblies and Hex Dumps can be scanned in *both directions.* Double-Take also features informative 2-Way HEX/ASCII DUMPS—

```
6000-  53 41 4D 50 4C 45 20 54   SAMPLE T
6008-  45 58 54 20 46 49 4C 45   EXT FILE
6010-  20 4C 49 53 54 45 44 20    LISTED
6018-  57 49 54 48 20 44 4F 55   WITH DOU
6020-  42 4C 45 2D 54 41 4B 45   BLE-TAKE
```

BONUS UTILITIES

CROSS REFERENCE: Fast display or printout of all variables & strings in a program, and the program lines on which each one occurs—

```
A$:  100  200  250  300
X:   10  20  3000  3010  3020
Y:   50  3000  4000  5200
```

VARIABLE DISPLAY: Displays all of a program's variables & strings with current values—

```
A$  =  "NOW IS THE TIME"
X   =  255
```

Better **RENUMBER/APPEND:** Append program lines *anywhere* into other programs (not just at the end) without the need to renumber.

PLUS: Free-Disk-Space, Enter Machine Code from Basic, Instant Program Stats, Ctrl-Character Display, In-Memory Hex/Dec Converter, Cursor Eliminate/Redefine, Auto-Line Numbering...

DOUBLE-TAKE $34.95
Includes Peeks & Pokes Chart *AND* Tips & Tricks Chart

PRONTO-DOS

HIGH-SPEED DOS/DOS-MOVE UTILITY
by TOM WEISHAAR

PRONTO-DOS triples the speed of Apple's Disk Operating System, adds new DOS features, and lets you load DOS into auxiliary memory for an *EXTRA 10K* of programmable memory space!

Here is a comparison with normal Apple DOS—

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
BLOAD LANGUAGE CARD ..	13 sec.	4 sec.

(Text Files: no change)

New, unprotected, high-speed disks (as many as you want), are created with the normal INIT command. Or your existing disks may be updated. Booting Pronto or any updated disk installs high-speed DOS in your Apple.

Moving DOS to your Apple II or II+ RAM Card or Apple IIe standard high-memory will free up a whopping **10,000 EXTRA BYTES** (that's 10K!) of valuable programmable memory space.

ProntoDOS gives you **15 EXTRA SECTORS** of disk storage space, almost one full track! This is space that is normally wasted by Apple DOS.

With ProntoDOS in your Apple, all disk catalogs will feature a Free-Space-On-Disk display, every time you Catalog. A great benefit!

ProntoDOS allows you to add a handy new **"TYPE" COMMAND** that reveals the contents of Apple Text Files. For example, the command "TYPE INFO" will print everything (to screen or printer) that is in the Text file named "INFO".

ProntoDOS is compatible with *all* DOS Commands, GPLE® and most of your programs.

PRONTO-DOS $29.50
Includes Peeks & Pokes Chart

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☐ Beagle Bag 29.50	☐ Tip Disk #1 ...... 20.00
☐ **BEAGLE BASIC** .. **34.95**	☐ Utility City 29.50
☐ DOS Boss 24.00	☐ ADD ME to mailing list.
☐ **DOUBLE-TAKE** .. **34.95**	☐ I'M ON mailing list.

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CHECKBOOK FINANCIAL SYSTEM

For Apple® II, II+, IIe, III emulation, and Apple look-alikes - 48K DOS 3.3

MONEY STREET SAVES YOU MONEY EIGHT DIFFERENT WAYS

1. You save income taxes. If you file an IRS 1040 and Schedule A, Money Street will catch every deduction and tax credit in your checkbook. No more lost deductions.
2. You save on CPA fees. At tax time, you'll get neat, clean print-outs of income, deductions, and tax credits, which saves CPA time.
3. You save by tax planning. Use Money Street in conjunction with any Apple tax preparation program, and create a "trial 1040" before year's end. See next year's tax obligation this year.

   If you earn more than $25,000, your "trial 1040" might mean thousands saved.
4. You save accounting time. For users who run a small business, own real estate, or offer professional services, Money Street can generate 90% of data needed for ledgers and journals.
5. You save on interest and service charges because Money Street maintains exact minimum balances.
6. You save NSF charges. Some banks now charge you $15 for each check.
7. You save credit charges because Money Street controls credit card accounts too.
8. You save because Money Street can change your financial attitudes. It's so much fun to use, you'll actually look forward to "bank statement" day. Better yet, Money Street gives you instant answers about income and spending.

It's called Money Street. It can cut your taxes, watch your budget, or save accounting fees.

The idea is simple. As the computer balances your checkbook, it creates a valuable library of financial facts that can be sorted, listed, totaled, scanned, printed, or viewed.

For example, it can print totals of your tax deductions, credits, and income. You'll save hours of accounting time. You can get estimated amounts any time for tax planning. Or, if you run a small business, you can print year-to-date (and monthly) totals of sales, departmental expenses, or salaries. All categories are user-defined, so you can choose which items to track.

Besides this, Money Street does your checkbook and bank statement chores. It gets you in balance and keeps you there. The program prints seven separate audit reports, creates an easy-to-access cancelled check file, and gives you a detailed report of each reconciliation session.

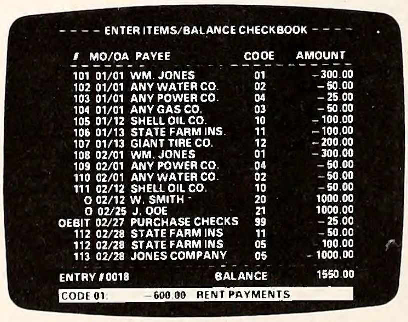
Additional Features.

- Split entries between codes.
- Fast machine language programming. Nine seconds from start-up to data entry.
- Handles unlimited checkbooks.
- Edit anything, any time.
- Credit card accounting.
- Cash accounting.
- Press Ctrl-Q for help screen.

15 Ready-to-print reports! Press four keys and the program will print any of 15 different reports. Just select from the Report Menu, and the program does the rest. Start-up to print time is usually 20 seconds. Reports include:

1. Monthly code totals
2. To-date code totals
3. Sort by amount
4. List code dictionary
5. Sort by payee
6. List deposits
7. List un'cld checks
8. List un'cld deposits
9. List all entries
10. Sort by date cleared
11. Print check registry
12. Print selected month
13. Print selected code
14. List code totals
15. List monthly totals

How it works. On your computer screen, you create a facsimile of your checkbook. You see 17 items per screen and can scroll for more. As the computer balances your checking account, you give each check or deposit its own category code. You get 100 you name'em codes. Press Ctrl-O and see a code dictionary. To set up codes, just type them in. You can add, delete, or change codes any time without affecting data.



Money Street's most amazing feature is its "real time" data bank. It accumulates year-to-date totals for each of the 100 categories. You see these totals instantly. Just enter a check, and look at the bottom of the screen. The year-to-date total will flash into view with each new entry.

Pays for itself. Money Street keeps things simple and keeps them honest. It can pay for itself ten times over just by saving the cost of organizing and totaling data. As one customer put it: "Why pay my $100-an-hour CPA to count beans?"

Happy customers. For us, the best thing about Money Street is our happy customers. Every day we get letters like the one from Jerry Losse of New York who wrote: "I'm very pleased. Money Street does everything but go to the bank".

- Keller Watson of California wrote saying, "The speed of operation is fantastic, the double cursor is a help to tired old eyes, and the data bank totals are worth the price of the whole program."
- A.W. Matthews of Colorado wrote to say, "...it is truly a relief to purchase software that does as advertised."
- William Sampar of Fairfax Station, Virginia wrote: "Money Street is everything you claim it to be. I love it. I love its speed and ease of operation."
- Glenn Rodkin, president of Oklahoma City Apple Users Group wrote: "Tremendous! It's fast, reliable and covers all the contingencies a checkbook program should."
- Michael Salesin of West Bloomfield, Michigan wrote: "When next year's tax season rolls around my accountant will send you love and kisses."
- Howard Serotta of Lansdale, Pennsyvania said: "I am totally pleased with Money Street. I like the sub-totals, the speed, and the many print options."
- Hisher Logic of San Luis Obispo, California wrote: "It's doing all my bookkeeping (six accounts) — what a time-saver."
- Gary Rominger of Sacramento, California wrote: "It works! I love it! Your claim of 30 minutes to learn it is fully justified."

If you own real estate, Money Street tracks rents, tallies repair costs, and helps establish "cost basis" for capital gain tax treatment. It's also ideal for trust accounting, retail stores, and home budgeting.

Money back no matter what. Why not give us a try? If you aren't delighted, we'll give you a full refund on any mail order purchase from us.

Includes tutorial, map, and reports. Money Street includes Program Map, complete documentation, on-screen demo, plus tutorial. For Apple® II, II+, IIe, III emulation, and Apple look-alikes. Requires 3.3 DOS, 48K. Money Street works with one drive, but two are preferred. It's also okay without a printer, but you'll miss a few reports. Master Charge, Visa, COD okay. Add $2.50 on all orders for postage and packing. To order or get additional information: call 24 hours and leave your name with our friendly answering machine.

The program is copy protected. We sell back-up disks for $10. We also offer a special utility disk that makes two back-up copies, makes quick copies of data disks, and allows fast sorts of selected months or code categories. Price is $25.

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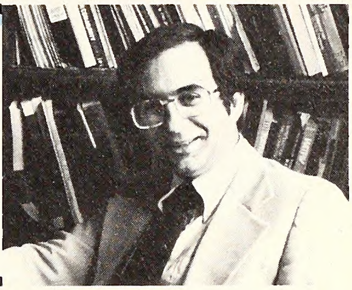
Mind Your Business

BY PETER OLIVIERI



You know how you feel when the weather is hot and humid—you'd like to jump into a nearby swimming pool, run through a fire-hydrant spray, or head for the air-conditioned office. Well, your Apple wouldn't mind doing the same kind of thing when the weather gets warm. We tend to think of our Apples as much more durable than they really are, but it's important to realize that computers are a bit sensitive to changes in temperature—in fact, heat, along with dust, is among a micro's major enemies.

It's wise to keep your machine in a cool place. Install a fan if necessary (a variety of fans are specifically designed to attach to an Apple). It's particularly important to consider purchasing a fan if you've added a lot of peripherals to your system; an Apple loaded with a printer card, an eighty-column card, a disk controller, and a language card can generate a lot of internal heat. Couple this with a hot environment and you are toying with trouble. It's also important to be aware that putting your equipment in a spot that gets very warm can result in heat-caused internal damage even if you have a fan; after all, since your computer's not on all the time, neither is your fan. The point here is, of course, that forewarned is forearmed. Don't get caught wishing you'd taken better care of your Apple's health.

While we're on the subject of health, it won't hurt to review briefly a few of the standard operating principles we all tend to get lazy about. Perhaps phrasing them as Murphy's Micro Laws is the best way to bring these points home.

1. A disk that does not have a backup copy lasts half as long as a disk that does. *(When did you make your last backup?)*

2. The probability that a disk without a label will be reinitialized accidentally is greater than one. *(Are all of your disks labeled? Are the labels accurate?)*

3. The number of electrical problems you are likely to have is equal to the number of plugs you have connected to one outlet, times ten. *(Take a quick look at how safe your electrical connections are.)*

4. The size of the repair bill for your Apple is equal to five times the weight of the things you have sitting on top of the machine. *(Is that heavy color television set still on top of your Apple?)*

5. The expected life, in months, of your microcomputer is inversely proportional to the height of the dust on the power supply. *(Do you have a dust cover?)*

6. The life of a printer ribbon is ten minutes less than the time it takes to print your most critical report. *(Have you checked your supply cabinet lately?)*

7. The probability that you'll have a problem with a software or hardware product is equal to the height (in inches) of the warranty cards sitting on your desk. *(Why not fill them out now and send them in?)*

8. The cost of repairing your Apple any one time is equal to fifteen dollars times the number of drink containers sitting on your computer table. *(Do users eat and drink while working at your machine?)*

Planning, Controlling, Decision Making. Managers, if they are really managers, must be constantly involved in planning, making decisions to bring about certain objectives, and getting feedback to control things along the way. Feedback is crucial to managerial decision making; it provides information needed to ensure that the objectives specified are actually met.

Consider for a moment what happens when you sit in a chair for a long period of time with one of your legs tucked underneath you. When you try to stand up, you discover that your foot has fallen asleep—what has happened is that the feedback sensors at the base of your foot are no longer functioning. And without feedback, you cannot exercise the control needed to accomplish your goal (to stand up).

Your computer can be an important tool in decision making; it can provide the feedback you need to make and monitor business decisions.

All too often, business people use the computer merely as a data processor—a producer of labels, mailing lists, or form letters. This is not to downgrade these important functions; they do save time, and time is a very valuable commodity to a manager. There is, however, another

stage, or level, of use to which the computer can be put. At this level, the computer assists its owner in the performance of sensitivity analysis of the effects various decisions may have. *VisiCalc* models are one good example of the computer being used in this way. In many *VisiCalc* models, the user can change the ground rules or assumptions and quickly see how this affects the results of the model being tested.

It's worth taking a few minutes to consider the other uses to which your computer might be put. Do you use a spreadsheet program to ask "what if" kinds of questions? Does your setting involve applications in which statistical analysis (such as frequency distributions, cross-tabulations, or averages) would be helpful? Are you using your computer for forecasting purposes? Have you considered using a graphics package to enhance your reports? Are you doing any scheduling by computer? Do you have applications in which optimization models, such as linear programming, would be useful? Have you considered using a modem to tie in to an information-resource utility?

There are many ways the computer can be used to save time and facilitate better business decisions. With this in mind, next month we'll begin a series profiling how various readers use their Apples to help them make better decisions. If you're using your Apple in ways that contribute to your planning, controlling, and decision-making activities, speak up; user-group members, let's hear from you.

Keeping Literate. As a business user you may not want to know everything there is to know about the inner workings of the Apple. If you're like most people, however, you're likely to be interested in understanding the computer terms you see frequently in the literature.

One such term is *megabyte.* Regular readers of this column will recall that a byte is the amount of memory required to store one character of information (either a letter or a number). Thus, a disk with 150K bytes of storage is capable of storing some one hundred fifty thousand characters of information. The prefix mega stands for million, so one megabyte is, roughly, one million characters; actually, a megabyte can store 1,048,576 characters. This number is arrived at by raising two to the twentieth power.

Because of the increase in the storage capacity of memory chips and disks, the term *megabyte* is showing up more and more often. There is now a small chip that can contain two hundred fifty-six thousand characters, and Apple's new Lisa computer has a one-million-character main memory capacity. Enclosed disk drives (so-called Winchester disks) have capacities of five, ten, and fifty megabytes. It is certainly sufficient to know that a megabyte can contain roughly a million characters.

Seen a UNIX Lately? It sounds like some kind of animal, doesn't it? Basically, UNIX is an operating system. As we mentioned last time in speaking of CP/M, an operating system essentially tells the computer how to operate. The operating system is an important part of a microcomputer system, and its designers try very hard to make it easy to use.

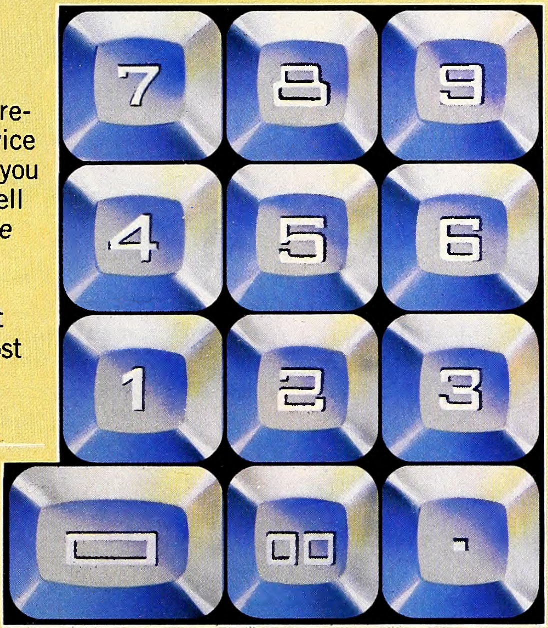
Professional programmers really like UNIX because it facilitates the development of applications programs. Although UNIX is a popular and powerful operating system, it's unlikely that we'll see a reasonably good version of it for the Apple; UNIX was designed to run on a different type of machine.

Spooling is yet another strange-sounding term you may have heard. It comes up primarily in discussions about printers. Most people have experienced the frustration of having to wait while the printer attached to the Apple prints out a particularly long report or large spreadsheet. While engaged in this activity, your computer is not available to do anything else. But if you could "wrap your program around a spool" and unravel it (print it) as needed, you might be able to use it for other things.

Spooling is done by a program that sits in main memory and monitors the use of your computer (when you are hitting the keys) and the operation of the printer. The spooling process allows you to use your computer at the same time that printing is taking place. By the way, vendors are now promoting a hardware device that sits between your computer and your printer. The material to be printed is sent to this "middleman" and resides in memory there, totally freeing up the computer to do other things. We'll look more closely at such hardware devices in a future column.

VisiCalc Users. The popularity of *VisiCalc* has given rise to a large number of supporting products created by various vendors. Some of

KEYS TO SUCCESS



Whether you have a small retail company, manage a service agency or run a cattle ranch, you have to do something else well to build a business—*manage money.*

You've got to analyze cash flow, see trends and forecast profitability in a time and cost effective manner.

The right fit.

A computerized accounting system makes sense, but finding the right software is important. The "home checkbook" programs are easy to use but they don't have the advanced reporting capabilities you need. And many small businesses just don't need the complexity or the cost of the modular systems.

Practical Accountant is a single entry, small business accounting program that comes complete in one package. It's friendly enough to balance your checkbook, yet sophisticated enough to give you the kind of money management information you need for a successful business.

We could have called it "Accounting Made Easy".

Practical Accountant is designed around fundamental accounting procedures. Even if you don't know much about accounting it is an ideal program.

The manual explains basic accounting terminology and provides a comprehensive tutorial. It will take you step-by-step through the process of setting up a complete, single entry accounting system you can begin using right away.

It's quick to learn and convenient to use.

The program guides you with easy-to-use menus and provides on the screen prompting. "HELP" is never more than a keystroke away. It even does some of your work for you like organizing entries in date order even if you don't.

It's very flexible. You set it up to fit your business.

Practical Accountant allows you to set up your "Chart of Accounts" (income and expense categories) with up to 50 categories, 300 sub-categories and with 20 tax type definitions—all defined by you. The manual shows you how to set up an accounting system for a small business, complete with samples.

Cash Flow Reporting— money management information.

Perhaps the most valuable feature of the program is the cash flow reporting capability. You can look at cash flow by category, by sub-category and by tax type to analyze profitability, tax consequences and general performance. All of your reports are professionally formatted and you have access to profitability information that leads to sound business management.

There is more to this success story.

If you would like to know more about Practical Accountant your dealer can give you a great demonstration and a brochure with a more complete story, or call Softlink TOLL FREE at 800 633-6300 (in CA 800 222-1244) and we will send you the brochure.

Practical Accountant

Single entry, small business accounting for the Apple IIe

$149.95
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these products are useful, while others have little merit. One useful product is CalcPad, a double-sided ledger-coding sheet for use in explaining and documenting templates constructed using *VisiCalc* and other spreadsheet programs.

Quite frankly, most of the difficulties users have with spreadsheet programs are associated not with using the programs themselves but with constructing models. This is particularly true when models become large and cumbersome. Most model builders make notes to document what they have done, and often these notes begin to acquire notes of their own, resulting in documentation that is weak at best. If you've gone to the trouble of listing out the formulas (contents) of your spreadsheet using the normal *VisiCalc* commands, you know already that doing this doesn't provide a particularly useful reference.

CalcPad makes a real difference in this regard, providing a valuable service. It is to be used as the first step in designing a model. If you use CalcPad, your final model will likely be well thought out and relatively error-free.

The layout of the CalcPad itself is well thought out. The upper left-hand corner has room for information about the disk on which the model will reside and the author of the model. The upper right-hand corner provides space in which to record what global characteristics are in effect.

The main portion of the ledger pad contains sixteen *VisiCalc*-like columns and thirty similar rows. Some room at the bottom of the page is reserved to record any formulas that are too long to fit into one of the cells on the sheet, along with information about replications that have been made. The replication information section is particularly helpful; you can use it to keep track of the source and target ranges of any replications and to record which of the variables in the formula being replicated are relative and which are no change.

The back of the form provides space in which to enter information on how to use your template—that is, how to "run" the model. Space is also allotted for supplying instructions about running the model and information about how files are to be handled (are DIF files to be used? Are various windows to be set? Are any overlay files needed?).

This pad can be very helpful—indeed invaluable—to users in planning out models. Sheets from the pad can also become a permanent part of the documentation of particular models.

The Krandel Affair. One of the nicest parts about writing this column is getting to help regular readers solve some of their problems. The response to a plea for help from Robert Krandel of San Jose, California, was especially pleasing. Krandel had an application in which he needed to be able to determine the number of salespersons who had sales that fell within certain ranges. For example, he wanted to know how many salespersons had sales between $100 and $200, how many had sales between $201 and $300, and so on.

Clearly, this became a real challenge to our readers; dozens of proposed solutions were submitted. Many thanks to everyone who responded, particularly Roy Bruno, who sent along a disk containing his *VisiCalc* solution to the problem.

The solution offered here incorporates some of the characteristics of well-designed models: namely, it's short, it's clear, and it works. The design includes the lookup function. Dwight R. Gard of Lubbock, Texas, is the author of this fine solution.

The template shown on the following page is one example of a solution to Krandel's problem.

The actual sales figures are set in cells A3 through A13. In cell B3, the expression @LOOKUP(A3,C3...C13) is entered and replicated from B4 through B13. The A3 is relative and C3 through C13 are no change. At B15, you use the expression @SUM(B3...B13). Next, you install the lookup table in cells C3 through C13. This is where the desired ranges are entered. Be sure to enter them in ascending order. In cells D3 through D13 the boolean values 0 or 1 are entered. Initially, these values are all 0.

Once you've decided what the appropriate ranges are to be, you can decide which range you are interested in (for example, sales between $200 and $299). Next to the lower end of the range (in this example, $200), enter a 1 as the lookup value. All the values outside that range remain at 0. After the 1 is inserted next to any other values in the appropriate range,

	A	B	C	D
	SALES	BOOLEAN VALUE (@LOOKUP VALUE)	LOOKUP TABLE	BOOLEAN VALUE
3	125	0	0	0
4	198	0	100	0
5	275	1	200	1
6	494	0	300	0
7	244	1	400	0
8	675	0	500	0
9	899	0	600	0
10	135	0	700	0
11	400	0	800	0
12	395	0	900	0
13	880	0	1000	0
14				
15	# IN RANGE	2		

the model is recalculated and the sum at B15 is displayed. Since only those sales that fell in that range will have the lookup value of 1 inserted in column B, the sum at B15 will be the count of how many salespersons fell within that range.

If you insert the names of your salespeople, it's very easy to see who it is that meets the specified criteria. And overall, it is very easy to change the ranges and search for the appropriate counts. While this solution requires that you inquire separately for each range of interest, its flexibility and ease of entry make the model very easy to use and implement.

It would also be possible to set up multiple columns to solve such a model, and, in fact, many of the solutions received used the @IF command in multiple columns to count those who fell in different ranges. The solution shown here was the easiest to implement. Of course, it's worthwhile to review the operation of the @LOOKUP command if it's unfamiliar to you.

B.U.G. S.O.S. Here are some more requests for assistance from Business User Group members. Edmundo Cardenas of Caracas, Venezuela, has a NEC PC 8023A-C printer and could use some help. Most of his printer commands are sent via a CHR$ rather than by means of a control keystroke. None of these commands seems to be working. Any help, suggestions, or references that might help Cardenas use this printer to print Spanish characters will be appreciated; in particular, Cardenas would like to be able to have the accent mark placed over the vowels. This could be accomplished if the printer could be made to backspace and overprint. He hopes "our B.U.G. people are as good as I think they are." There's a challenge for you!

Rudy Bergfield of the Netherlands writes to ask for some word processing assistance. Bergfield has both *Apple Writer II* and *WordStar*. He has successfully used the Epson instructions (on an MX-80 F/T) that appeared in an earlier column but has had trouble with one particular printer instruction, the one for underscoring. Bergfield feels that the problem he's experiencing may have something to do with the eighty-column card he's using (a Vision 80 card with a preboot disk that enables *Apple Writer* to use eighty columns). In the eighty-column mode, using control-V and then escape-1 to initiate underscoring works fine, but it cannot be turned off. In eighty-column mode, using escape shift control-P does not turn off the underlining, but it does work when Bergfield uses *Apple Writer* in forty-column mode. (Incidentally, underlining using the reverse slash before and after also works, but it doesn't give the continuous line Bergfield sometimes needs.) Anyone out there with a Vision 80 (or a solution)?

Wrap-up. By the way, while there's often a lot of mail in direct response to B.U.G. requests for help, the old post-office box has been far from overflowing with those useful utilities that were asked for a few months back. Are you using, do you know of, or have you developed any utilities you think other readers might find useful? Are there, for example, any programs available that allow you to print out a copy of the menus in an applications package? Have you developed an innovative way of cataloguing your files? Or maybe there are utilities you'd like to have but have never seen. Send in your wish list and we'll see whether we can match up what you want with what someone else has devised or knows about.

Until next month, take care and have a pleasant August. ❏

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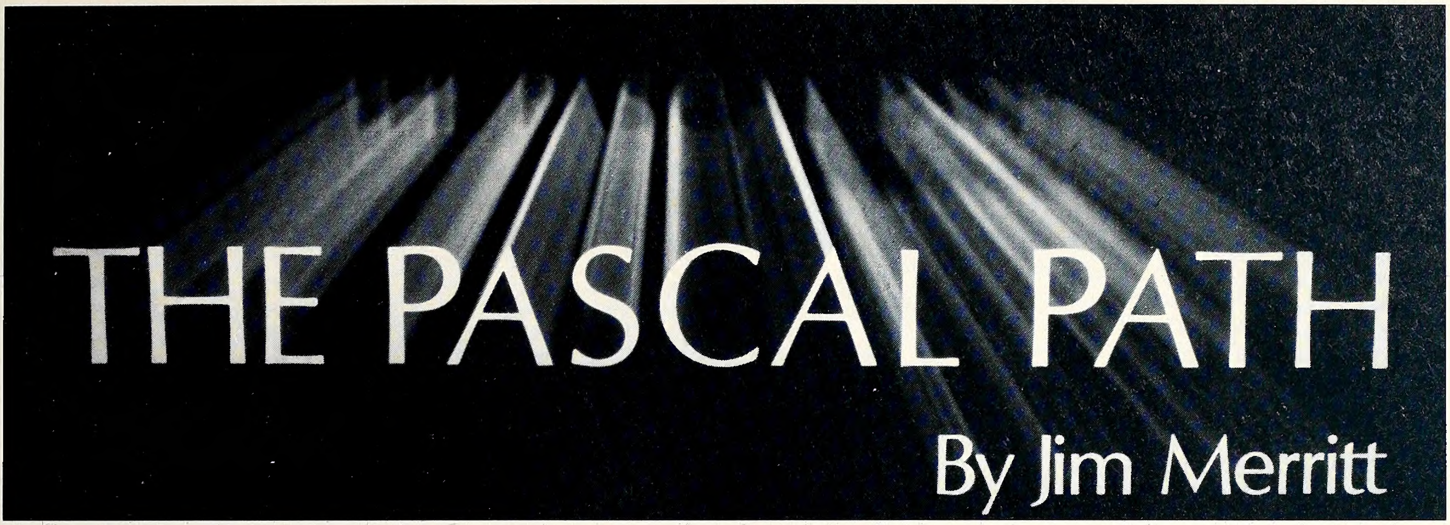


Jungle Fever: Part 6

Variant RECORDs. Casting around to find some new components to rejuvenate his ancient (but still listenable) stereo system, Your Pathfinder was impressed by the wide range of equipment that now features microprocessors. Tape recorders, amplifiers, equalizers, AM/FM tuners, turntables, videotape and disc systems, and many other pieces of stereo gear now boast "full microprocessor control." In the old days, you *operated* your stereo equipment; now, you *program* it, and it practically operates itself. Some forward-thinking firms are even marketing interface packages that permit a personal computer to act as an "intelligent control panel" for such items as laser videodisc players.

Soon, computer interfaces will be built into all stereo and video components by the manufacturers, and we will be that much closer to the day when your home computer system and your home entertainment system are one and the same. Although that day is still several years in the future, we may certainly dream of it and prepare for it. It was during a blissful reverie concerning this very subject that Your Pathfinder realized a relatively painless method of introducing you to Pascal's *variant RECORD* structure.

The Pain of Progress. Many of the latest stereo receivers and tuners feature "all-digital" frequency adjustment. The hapless radio listener must punch in the *exact* frequency of the desired station, using a calculator-style numeric keypad. Most people tend to remember the call letters or nicknames of their favorite radio stations but find it more difficult to remember the radio frequencies on which those stations transmit. The situation is aggravated by the tendency of broadcasters to publicize their frequency assignments imprecisely. For instance, certain FM stations announce themselves as "FM91," "Z93," and "Q104," although their actual frequencies are 91.3 MegaHertz (MHz), 93.3 MHz, and 104.5 MHz, respectively. Similarly, several AM stations at 1480 kiloHertz (kHz) have been known to bill themselves as "The Great 148," while a well-known San Francisco Bay Area AM station at 1170 kHz billed itself for many years as "11.7 AM!"

Given such misleading information, how can the owner of a digital tuner possibly deduce the proper frequency numbers to punch when seeking a specific station? To help alleviate this problem, most "computer tuners" of today permit the user to record the frequency assignments of several favorite stations in permanent electronic memory within the tuner itself. Once this is accomplished, the listener can choose one of the preset frequencies simply by pressing the appropriate button.

When home computers enter the picture (and perhaps even before), radio tuning can be made even more convenient. In particular, the user will be able to specify a station by its easily remembered *name*. Suppose there someday exists an interface that permits an Apple to control one of the new generation of AM/FM tuners. It would be a simple matter for the Apple to maintain a list of radio station names along with the corresponding frequency assignments. The human user would request a favorite station by name, via the computer keyboard, and the Apple would then scan its table for the entry that corresponded to the given name. Finding it, the computer would transmit the commands necessary to adjust the tuner to the proper frequency.

Tabling the Issue. How would one go about defining a table of radio stations in Pascal? Clearly, each entry would have to consist of a name and a frequency designation. These two data are most naturally expressed as a String and a number and are most conveniently combined in a RECORD:

```
TYPE
  Station=
    RECORD
      Name
        :String[15];
      Frequency
        :Integer
    END (* Station *);
```

Note the economy of using a fifteen-character String in place of the standard eighty-character model. There's no point in reserving more space for any field than is necessary to get the job done. Station nicknames and call signs are very brief; the Name field should be large enough to hold all call signs as well as all but the most verbose nicknames or slogans. If a station name is too long, one may always use the much shorter call sign.

The Integer field, Frequency, is sufficient for recording AM frequency assignments such as 1170 and 1480 kHz, but what about FM frequencies, such as 91.3 and 104.5 MHz? It is more natural to record FM frequencies as Real numbers. Given this, we might want to define two data types, AMStation and FMStation, both identical in general structure, except that the Frequency in the first would be recorded by an Integer, while the Frequency in the second would be represented by a Real number. Such a solution would solve our conceptual problem but would prevent us from establishing a table of radio stations that includes both AM and FM assignments. A table is most naturally expressed in Pascal as an ARRAY, or sometimes as a FILE. The rules of Pascal state that individual elements in either structure must all share the same data type.

To establish two different types for station data is to force ourselves to construct and maintain two different tables, one for AM stations and one for FM stations. Lazy programmers such as Your Pathfinder would shy away from this kind of extra labor, opting instead (perhaps) to put fields for every contingency in a single RECORD definition:

```
TYPE
  Station=
    RECORD
      Name
        :String[15];
      AMFrequency
        :Integer;
      FMFrequency
        :Real
    END (* Station *);
```

Now, both AM and FM stations may be recorded conveniently in the same table.

To make use of our latest version of Station, we can agree that either the AMFrequency *or* the FMFrequency—but never both—will contain a zero value. If AMFrequency is not zero, then the corresponding station broadcasts on the AM band; otherwise, FMFrequency will be nonzero, indicating that the station in question is an FM outlet. Note that there is no field in our current definition of Station that designates transmission *mode* (AM or FM). Station is concerned only with transmission *frequency*; the mode must be inferred from the frequency. In other words, the frequency fields serve two purposes at once: one that is *explicitly* suggested by the field names, and one that is *implicit* in the structure of the RECORD itself.

Frolic in the Fields, but Avoid Entanglements. When defining RECORDs, the best policy is to establish fields that are each significant in one and only one context. In other words, you want to use each field for a single, explicit purpose; you don't want to load it down with several implicit duties. In practice, you will find it difficult to adhere to this discipline. To the extent that you succeed, however, you will simplify the task of maintaining and improving your code at a later date.

If a datum has several different functions, chances are that many different parts of the program will need to refer to it. Conversely, if a datum serves only one purpose, you can probably isolate the code that depends upon it in a small number of prominent locations. Eventually, you may want to alter the structure of a particular datum in such a way that the majority of code that depends upon it will also have to be changed. When the amount of affected code is large—as it is likely to be for a multipurpose datum—you will have a large amount of tedious work to do. Much less work is usually involved in changing the structures of "single-purpose" data objects.

Keeping good software development practices firmly in mind, it's probably best to create a separate field for recording a station's transmission mode:

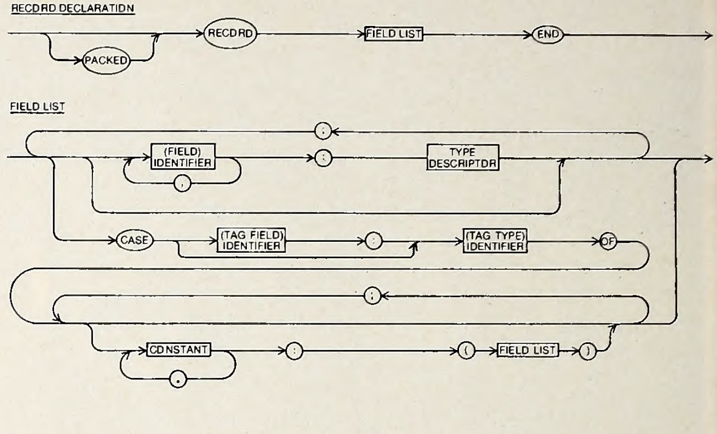
```
TYPE
  Station=
    RECORD
      Name
        :String[15];
      XMode
        :(AM, FM);
      AMFrequency
        :Integer;
      FMFrequency
        :Real
    END (* Station *);
```

Radio trivia buffs will already have guessed that the field name XMode echoes "xmit," the traditional radio operator's abbreviation for "transmit."

At this point, we have a RECORD structure that satisfies all the needs of our application. First, we can store call sign and frequency information for both AM and FM stations in the same ARRAY or FILE. If code that accesses a Station entry needs to know the transmission mode of the corresponding station, it can check the XMode field. Given this knowledge, it can then go straight to the active "frequency" field and bypass the dormant one altogether.

Even though our design works, however, it is somewhat ugly. For instance, why should we reserve space for both AM and FM frequency numbers when any given Station entry will use only one of them? Of course, the waste of a word or two in the definition of Station is probably tolerable; the station table is likely to contain so few entries (no more than a hundred, say) that the net waste will be slight. But what about a table with a *thousand* entries? Then, the waste of even a single word (two bytes) in every RECORD translates into a net loss of *two-thousand* bytes—nearly 2K of RAM!

Variants Save Space. When RECORD fields are *mutually exclusive*, as the frequency fields are in Station, you can make use of Pascal's *variant RECORD* facility to eliminate unnecessary, redundant fields. The accompanying figure is the railroad diagram for a RECORD structure, including those paths that may be used to define a variant RECORD.



RECORD Declaration

Use it to verify the syntactic correctness of the following variant RECORD version of Station:

```
TYPE
  XmitMode=        (AM, FM);
  Station=
    RECORD
      Name
        :String[15];
      CASE XMode: XmitMode OF
        AM:
          (AMFrequency
            :Integer);
        FM:
          (FMFrequency
            :Real)
    END (* Station *);
```

In the new Station, the fields Name and XMode remain *invariant*. In other words, these fields will be present in all variables of type Station. The Pascal compiler assigns separate memory space for each variable. On the other hand, only one of the *variant* fields, AMFrequency or FMFrequency, will be used (active) in any particular Station variable. All the different variant fields exist *simultaneously* in a RECORD's *variant data region*. Stated another way, all the variant field definitions in a given RECORD are different names for (and descriptions of) the same area in memory.

As you might suspect from looking at the definition of Station, the XMode field is especially significant. It is called the *tag field* of this variant RECORD. As a tag field, XMode is the means by which your Pascal programs can decide how to interpret the contents of the variant data region. Thus, if KXYZ is an AM station, the tag field in its table entry should contain the value AM, while the variant data region entry should contain an Integer value that corresponds to the station's transmission frequency. Conversely, should the tag field in the table entry contain the value FM, this implies that the variant data region is occupied by a Real value that corresponds to the FMFrequency field. In either case, your programs should not attempt to access the inactive field.

Variant Size Considerations. The sharp-eyed reader has already realized that the AMFrequency field, being an Integer variable, is only half as large as the Real-number field, FMFrequency. Yet both fields occupy the variant data region simultaneously! When designing variant records, bear in mind that *the variant data region in a* RECORD *is always made large enough to accommodate the largest variant field.* Since FMFrequency is the largest variant field in Station, the variant data region in a RECORD of that type consists of four bytes (the size of a Real variable). When the FMFrequency field is active, the entire variant data region is occupied by the bit pattern that corresponds to the appropriate frequency, expressed as a Real number. When the AMFrequency field is active, only the *first half* of the variant data region is occupied by meaningful information (that is, by a bit pattern that corresponds to an Integer number). The remaining two bytes contain useless garbage.

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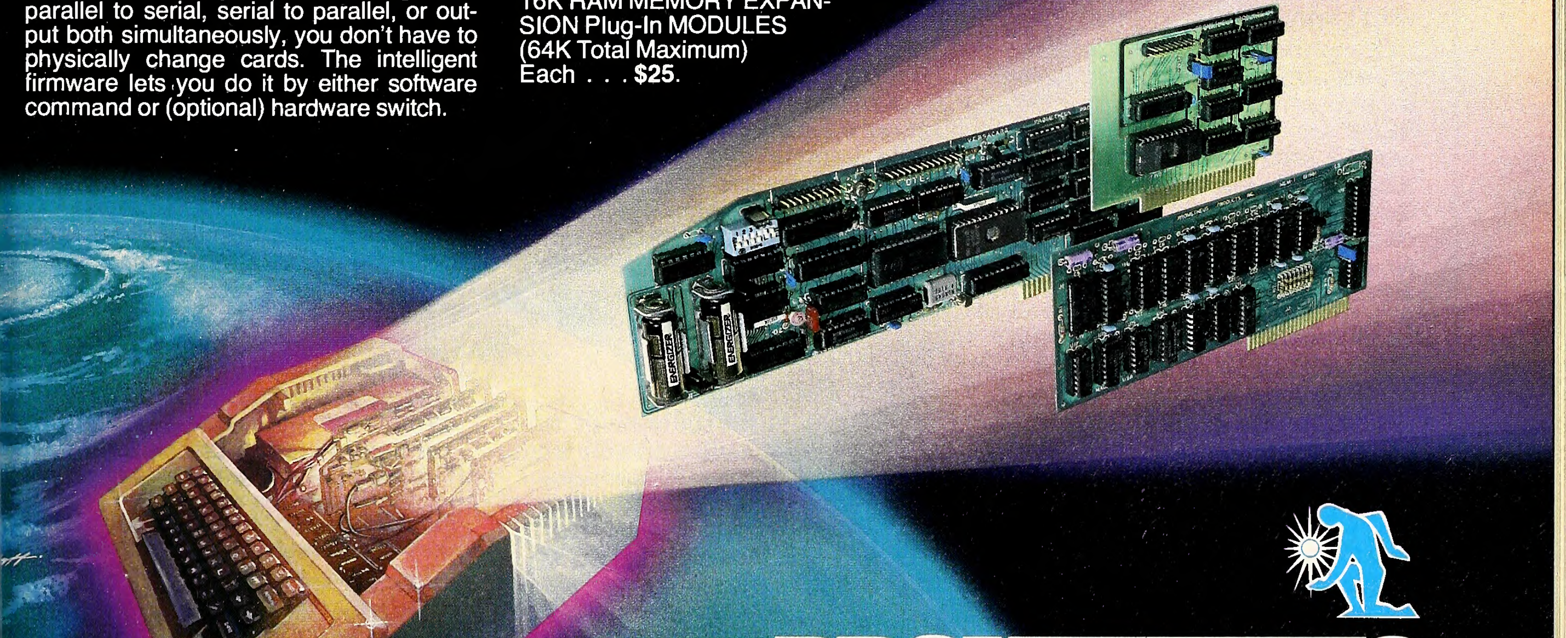

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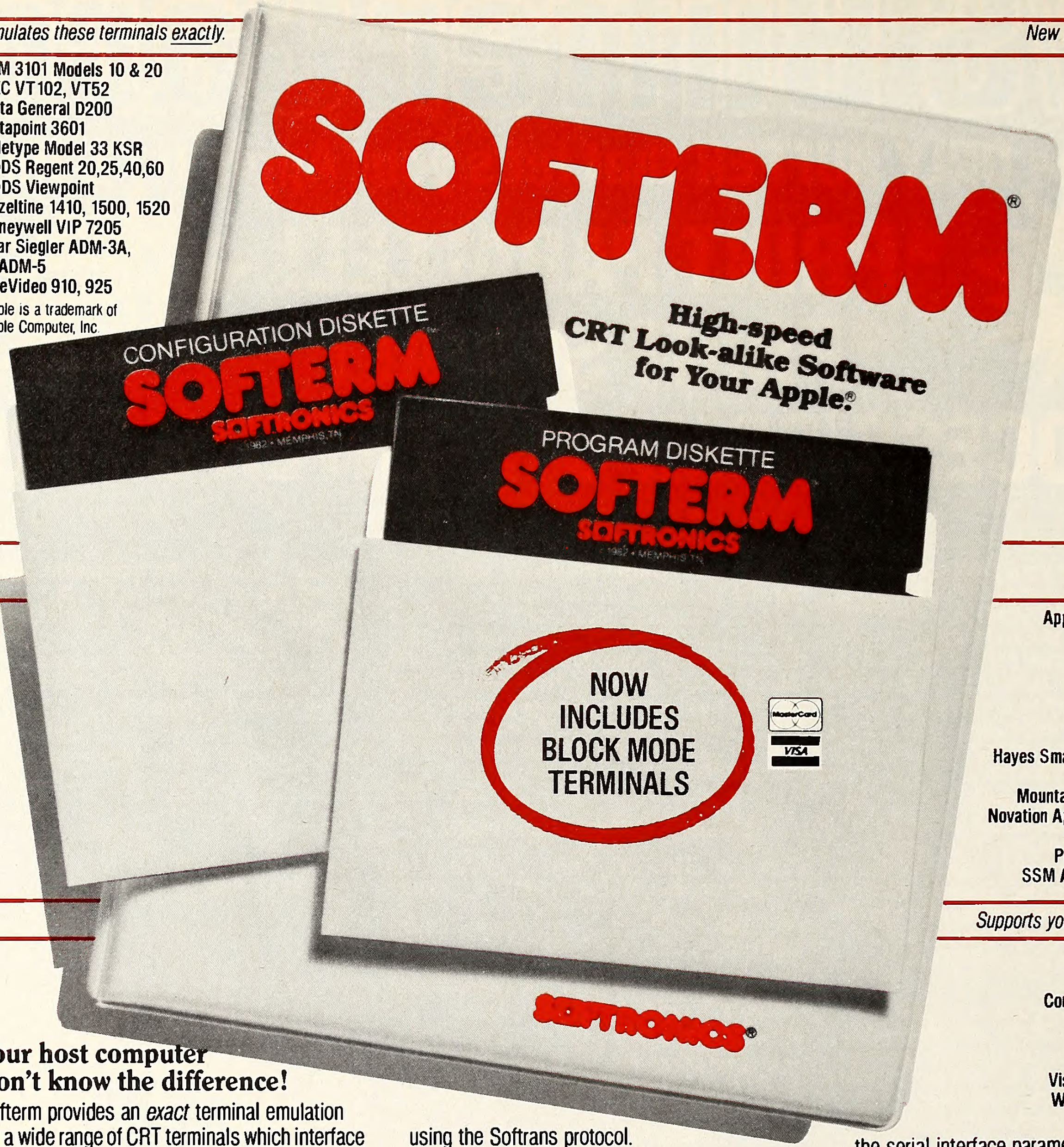

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The size of a variant RECORD—the amount of memory it occupies in RAM—is the sum of the sizes of its invariant and variant data regions. A Station variable's invariant data region holds eighteen bytes: the Name field requires sixteen bytes, and the tag field, XMode, occupies two. As we've already seen, the variant data region is four bytes long, and so the total size of a Station entry is twenty-two bytes (eleven words).

Whenever possible, all variant fields should occupy roughly the same amount of space in RAM. This will help to ensure that the variant data region is utilized most efficiently. If some variants are much bigger than others, and especially if these larger variants are only infrequently required in a particular application, much of the variant data region may remain unused and ignored. For example, Pascal normally allocates 410 bytes of RAM for any variable of the following RECORD type, due to the fact that a large ARRAY is one of the variants:

```
TYPE
  BigVariant=
    RECORD
      First,
      Second
        :Integer;
      Third
        :Real;
      CASE BoolTag: Boolean OF
        False:
          (TinyVar: Char);
        True:
          (BigVar: ARRAY [0 .. 99] OF Real)
    END (* BigVariant *);
```

When the TinyVar variant is active, nearly all of the RAM space allocated to a BigVariant variable lies dormant and inaccessible.

A Closer Look. The specification of any variant data region in a RECORD is roughly similar in form to that of the CASE statement, with which we are already familiar. However, there are some important differences between the two, which will become clear as we dissect Station's definition in terms of grammar (syntax) and meaning (semantics).

The variant CASE clause indicates to the compiler that the RECORD being defined should include a variant data region. Moreover, this clause establishes the name and data type of the tag field. (Although the tag field is introduced in the clause that establishes the variant data region, we'll find it more useful to consider this field as a part of the *invariant* region, since it will be present in every RECORD.) Unlike the selector in a CASE statement, a variant RECORD's tag field must be an identifier, not an expression, since it refers to a region of memory (in other words, a variable). Like any variable, a tag field must also be associated with a data type, which must be specified by name. The special type XmitMode was made necessary in the latest version of Station because the data type of a tag field may *not* be specified explicitly. Tag fields may be based on any scalar data type except Real.

Following the CASE clause is a list of variant fields. Each variant begins with its own list of constant values, taken from the data type of the tag field. A variant is considered "active" whenever any of the values in its constant list is contained within the tag field. Values in a constant list are separated from each other by commas, and the entire list concludes with a colon. Note that no value may appear in more than one variant constant list in a given RECORD declaration. Thus, the following TYPE definition is erroneous:

```
TYPE
  TFType=      (A, B, C);

  BadVariant=
    RECORD
      CASE TagField: TFType OF
        A:
          (IntField: Integer);
        B:
          (BoolField: Boolean);
        A, C:  (* WRONG — A is not legal here *)
          (CharField: Char)
    END (* BadVariant *);
```

This problem situation, however, is not detected by the Apple Pascal compiler, so watch out! An anomalous data definition such as this will not impede the compilation or execution of a program, but it does indi-

cate a certain lack of discipline and understanding on the part of the programmer, which may be reflected in more serious errors at other points in the code.

Following each variant constant list is a parenthetical sequence of data items, which constitutes the *variant field* that is associated with the given list of constants. Except that it begins with an "open-parenthesis" mark instead of the keyword RECORD, and ends with a "close-parenthesis" mark instead of the keyword END, a variant field is identical in structure to a RECORD body. In other words, a single variant field may contain many different subfields, and may also contain embedded RECORDs (even variant ones!).

Finally, the definition of the variant data region is concluded with the keyword END. According to the rules of Pascal, a RECORD may contain only one variant data region, the definition of which must be the last item in the RECORD declaration. Consequently, *the* END *that terminates the variant definition section also concludes the* RECORD *declaration*!

Winning at Tag. It is probably best to think of the variant RECORD tag field as a kind of label that characterizes *but does not dictate* the contents of the variant data region. In a Station variable, for example, an XMode value of AM suggests that access to the AMFrequency field is "safe"; in other words, that the pattern of bits in the first two bytes of the variant data region corresponds to a valid Integer number. A tag field value of FM indicates that the program should interpret the entire four bytes of the variant data region as a Real number, by accessing it as the field FMFrequency.

It is possible, however, for your program to access FMFrequency when the tag field contains AM, and AMFrequency when XMode is FM. Indeed, Apple Pascal will allow your program to access *any* variant field at *any* time, irrespective of the contents of the tag field.

The program that uses a variant RECORD is responsible for setting the tag field appropriately when storing information into the variant data region, and for checking the tag field value before accessing any variant field. Unlike some Pascal systems, Apple Pascal does not *insist* that these rules be followed. But it is usually pointless to access a Real variable as if it were an Integer, and vice versa. For one thing, the first two bytes of the four-byte bit pattern for the Real number 2.0 do not contain the same pattern of bits as the two-byte Integer number 2.

Except for what the tag field *implies* about the variant data region, the two entities are separate and independent of each other. In particular, assignment to the tag field does not in any way alter the bit pattern within the variant data region. When first learning about variant records, many people assume that changing the tag field value implies automatic data conversion. In the case of Station, for instance, one might get the impression that changing XMode from AM to FM would cause Pascal to convert the Integer value of an AMFrequency to the Real value of an FMFrequency. (For sake of argument, let's ignore the fact that such a conversion would always produce Real numbers which lie outside the range of valid FM frequencies.) In reality, no conversion occurs. The contents of the variant data region remains unchanged. By changing the value of the tag field without also assigning a new value to the appropriate variant data field, we merely arrange to look at the same old data from a new perspective. Beware, though. While you are certainly free to call a fish a "dog," you should not be surprised or disappointed when it fails to bark!

Field Names: A Compromise. Recall that all field names in a "regular" RECORD must be unique. This applies to variant fields, too. You may wonder why this is so; if only one variant may be active at any given time, why can't they all share the same name? Certainly it would be more convenient for us to refer to the transmission frequency with a single field name, Frequency, rather than having to distinguish between AMFrequency and FMFrequency. After all, the XMode tag field is supposed to make that distinction for us, isn't it?

The problem lies in the limitations of Pascal's type-checking facilities, and in the fact that the compiler is unable to predict the execution behavior of a program. Suppose each of Station's variants could be named Frequency. Suppose also that we wanted to display the frequency assignment of a given station, as recorded in a Station variable named StatVar. The easiest way to do this would be to use the procedure call WriteLn(StatVar.Frequency). But how can WriteLn—or even

the compiler, for that matter—deal correctly with StatVar.Frequency without knowing whether it is an Integer or a Real number? Because the tag field is a variable, its contents—and so the expected character of the variant data region—can only be determined at execution time. In order to provide for this variability, the Pascal compiler would have to treat the WriteLn of a variant field as if it were actually a CASE statement that included several calls:

```
CASE StatVar.XMode OF
  AM:
    WriteInt(Output, StatVar.Frequency);
  FM:
    WriteReal(Output, StatVar.Frequency);
END (* CASE StatVar.XMode *);
WriteLn(Output);
```

Anticipating that many Pascal system implementors would find it infeasible to make their compilers clever enough to handle ambiguous variant field names, Pascal's designer, Niklaus Wirth, decided that it would be better for the language to require that *all* fields of a RECORD, including the variants, have unique names. While this policy increases the amount of work involved in defining a RECORD, it promotes a simple, straightforward compiler, and also renders Pascal programs more readable to humans, as well.

Free Unions. A variant RECORD that includes a tag field is properly called a *discriminated union* in the jargon of computer science. All this means is that two or more data types overlay each other in the variant region of the RECORD, and a tag field is used by a program in deciding how to view the ambiguous area.

A *free union*, on the other hand, has no tag field at all—no basis for resolving variant ambiguity. If you look closely at the figure on page 194, you will see that the variant CASE clause must always include a type designation in the space for the tag field, but it need not include a variable identifier! Thus, you may define RECORDs such as the following:

```
CONST
  WordSize=16;          (* Number of bits in an Integer *)
  MaxBit=   15;         (* ALWAYS WordSize - 1 *)

TYPE
  VisibleInteger=
    RECORD
      CASE Boolean OF
        False:
          (I: Integer);
        True:
          (Bits: SET OF 0 .. MaxBit)
    END (* VisibleInteger *);
```

Except that the tag field is "anonymous" (indeed, nonexistent), the specification of a free union employs the same CASE-oriented syntax as the definition of a conventional variant RECORD. Of course, it is somewhat silly for Pascal to require the programmer to declare a tag field data type, then tie each variant field to a list of constant values drawn from that type, when the RECORD itself contains no tag field! On the other hand, free unions are of such questionable utility (and are, in fact, so rarely used) that it would have been just as silly for Niklaus Wirth to invent a special, "cleaner" syntax for these structures when only a slight modification of the existing variant RECORD mechanism would do the job.

When defining free unions, you must be careful to choose (or invent) tag field data types that contain at least as many scalar values as there are variants in the RECORD structure. Remember, no constant value may be associated with more than one variant field. For a union with two variants, Boolean is a proper (and popular) tag field type. For more complicated unions, you may wish to associate the absent tag field with Char or even Integer.

The following program, ShowBits, demonstrates the use of the free union VisibleInteger, by permitting convenient, interactive examination and modification of the individual bits in an Integer variable.

```
PROGRAM
  ShowBits;

CONST
  VersionMark=
    'SHOWBITS: Displays Integer as 16 bits (Ver. 1)';

(* This program permits the user to change arbitrary bits of an Integer
   variable, and see on the video screen how such changes affect the
   value stored in the variable. A "free-union" record structure is used
   to provide convenient, simultaneous traditional access and bitwise
   access to the contents of the variable under scrutiny.
*)

(* The usual text-manipulation constants *)
  Empty=           '';
  Blank=           ' ';

  Escape=          27;    (* ASCII ESC character *)

(* Constants unique to this application *)
  BitFCol=   10;          (* Bit field starts in 11th column*)
  BitFRow=   14;          (* ... and 15th row.             *)
  IntFCol=   30;          (* Int field starts in 31st column *)
  IntFRow= BitFRow;       (* ... and same row as Bit field. *)

  IFW=         6;         (* Width of Int field             *)

  WordSize= 16;           (* Number of bits in an Integer *)
  MaxBit=    15;          (* ALWAYS WordSize - 1 *)

TYPE
  VisibleInteger=
    RECORD
      CASE Boolean OF
        False:
          (I: Integer);
        True:
          (Bits: SET OF 0 .. MaxBit)
    END (* VisibleInteger *);

  PROCEDURE
    GotoBitField(Offset: Integer);
  BEGIN (* GotoBitField *)
    GotoXY(BitFCol+Offset, BitFRow);
```

```
END       (* GotoBitField *);

PROCEDURE
  GotoIntField(Offset: Integer);
BEGIN (* GotoIntField *)
  GotoXY(IntFCol+Offset, IntFRow);
END       (* GotoIntField *);

PROCEDURE
  ShowAsBits(VI: VisibleInteger);
  VAR
    Bit
      :Integer;
BEGIN (* ShowAsBits *)
  GotoBitField(0);
  FOR Bit := MaxBit DOWNTO 0 DO
    IF (Bit IN VI.Bits)
      THEN
        Write(Output,'1')
      ELSE
        Write(Output,'0');
END       (* ShowAsBits *);

PROCEDURE
  ShowAsInteger(VI: VisibleInteger);
BEGIN (* ShowAsInteger *)
  GotoIntField(0);
  Write(Output, VI.I:IFW);
END       (* ShowAsInteger *);

PROCEDURE
  ModifyBitField;

  VAR
    BitPosition
      :Integer;
    I
      :VisibleInteger;
    Ch
      :Char;
BEGIN (* ModifyBitField *)
  I.I := 0;
  BitPosition := 0;
  ShowAsBits(I);
  ShowAsInteger(I);
  REPEAT
    GotoBitField(MaxBit-BitPosition);
    Read(Keyboard, Ch);
    If (Ch = Blank)
      THEN
        BitPosition := ((BitPosition + 1) MOD WordSize)
      ELSE
        IF (Ch <> Chr(Escape))
          THEN
            BEGIN
              IF (BitPosition IN I.Bits)
                THEN
                  BEGIN
                    I.Bits := (I.Bits - [BitPosition]);
                    Write(Output, '0');
                  END
                ELSE
                  BEGIN
                    I.Bits := (I.Bits + [BitPosition]);
                    Write(Output, '1');
                  END;
              ShowAsInteger(I);
            END;
  UNTIL (Ch = Chr(Escape));
END       (* ModifyBitField *);

PROCEDURE
  ShowInstructions;
BEGIN (* ShowInstructions *)
  WriteLn(Output);
  WriteLn(Output, '  DIRECTIONS: Press space bar to advance');
  WriteLn(Output, '    cursor leftward (toward bit 15).');
  WriteLn(Output, '    Press any key except ESCAPE-key to');
  WriteLn(Output, '    "flip" the current bit. Press the');
  WriteLn(Output, '    ESCAPE key to quit.');
  WriteLn(Output);
    WriteLn(Output);
    WriteLn(Output, '    high  BITS  low   =  INTEGER');
    WriteLn(Output, '    ------------------     ---------');
  END       (* ShowInstructions *);

BEGIN (* ShowBits *)
  WriteLn(Output, VersionMark);
  ShowInstructions;

  ModifyBitField;
END       (* ShowBits *).
```

As an aside, we should recognize that ShowBits is an effective demonstration of the internal structure of an Integer, partly because it uses the Apple Pascal built-in procedure GotoXY to position the video cursor at arbitrarily selected points on the screen, in order to create and maintain special "display fields" there. GotoXY is explained quite thoroughly in Chapter 3 of your *Apple Pascal Language Reference Manual*, in the section entitled "Miscellaneous Built-Ins." In times to come, we will also be making extensive use of GotoXY, so you should make a point of studying and experimenting with this facility at your earliest opportunity.

Returning to the subject of ShowBits and its use of the free union, we should note that one may, of course, access single bits through normal, arithmetic means that do not involve variant RECORD trickery of any kind. The conventional method of doing this, however, is generally much slower and more cryptic than the "direct access" that is engendered by a free union.

In VisibleInteger, we take advantage of the fact that a SET of sixteen elements (here, the Integers 0 through 15) occupies sixteen bits, or a single p-machine word (two bytes). Thus, such a SET uses the same amount of RAM memory space as an Integer value. Each member of the SET occupies a single, unique bit position in the word. As it happens, the SET element that corresponds to 0 is stored in the word's least significant (rightmost) bit, while that corresponding to 15 is stored in the most significant (leftmost) bit. The bits in between correspond to the potential SET members from 14 down to 1, scanning from left to right. In an empty SET, all bits are turned off. By adding a particular member to the SET, we turn the corresponding bit *on*; removing that member turns the corresponding bit *off*. To see how changes in the individual bits affect an Integer's value, we simply change our point of view, exploiting the structure of the free union to treat the SET as if it were an Integer. (And who's to say it isn't?)

Free Unions: Pro and Con. By eliminating the tag field in a variant RECORD to form a free union, you achieve a couple of desirable objectives. For one thing, you conserve a slight amount of memory space with each RECORD. As we've mentioned, savings of even one or two bytes per RECORD can be important when the corresponding RECORD type is used to define the elements for a large array. Furthermore, software that doesn't bother to set, reset, or verify the contents of a tag field can run much more quickly than software that does.

On the other hand, a programmer must acquire and depend upon detailed knowledge of the internal format of Pascal data objects, in order to make intelligent use of free unions. You stand on very shaky ground when you put yourself in such a situation. What if Apple decides to change the internal representations of objects that certain of your programs manipulate through free unions? Probably, those programs will become obsolete, suddenly failing to execute properly. Moreover, the tag field—when set and observed conscientiously—can certainly contribute to the ongoing reliability of any program that uses variant RECORDs. It is not a tool to be dismissed lightly.

In the opinion of Your Pathfinder, there is no application worth mentioning that absolutely requires a free union structure. Programmers will be programmers, however, as enamored of toys and clever tricks as any child. (Indeed, it is probably the childlike suppleness of a programmer's mind that suits her to the vocation!) Thus, you will certainly encounter the free union again, perhaps in this very space! In any event, you deprive Apple Pascal of its ability to help you avert catastrophe whenever you exploit the chinks in its type-checking armor. Always bear this in mind whenever you are tempted to veer too far from the well-marked Pascal Path. ❑

HARD TALK

BY JEFFREY MAZUR

One of the benefits the Apple II realizes from being the longest-running, most expandable personal computer is the incredible array of peripherals that have been designed for it. Each month, it seems, manufacturers bring forth new and better products. Whether it's a disk drive, modem, or special interface card they're looking for, Apple owners have by far the widest selection of items from which to choose. This month let's look at some of these top-of-the-line peripherals.

Vista V1200 Floppy Disk System. Despite a growing selection of hard disk drives, RAM disks, and bubble memory cards, the minifloppy disk remains the most popular means of mass storage. And towering over the new double-sided, quad-density (ninety-six-track-per-inch), and half-height drives is the king of floppy disk storage—the V1200 from Vista Computer Company. This disk drive provides six megabytes of formatted storage capacity, along with an extremely fast access time and data storage rate. These features, plus easy backup, make the V1200 an ideal choice for applications that require the storage of large amounts of data.

The V1200 improves upon the standard floppy disk drive in three ways—storage capacity, speed of operation, and data transfer rate. Let's consider each of these for a moment.

The V1200 drive uses a cartridge assembly, or VistaPak, containing five separate disks. Thus the full six megabytes are divided amongst the five disks (called platters), requiring that each disk store 1.2 megabytes. The drive has only one read/write head, so only one disk can be loaded into it at a time.

Selecting and loading a disk is the function of the picker mechanism. Much like the jukebox of yesteryear, the cartridge assembly can be pivoted to present any given disk to the picker arm. This arm can then reach out and grab the disk by a special hole punched near the disk's leading edge. The picker arm can then pull the disk into the drive, where it will be clamped by a spindle arrangement similar to that found on ordinary drives.

Storing 1.2 megabytes on a single floppy disk (single-sided, no less) is no trivial feat. The V1200 has a track density of 170 tpi (tracks per inch) and a recording density of 9,500 bpi (bits per inch), as compared to the 48 tpi and 5,000 bpi of a standard Apple disk drive; obviously, this is no ordinary drive mechanism. Of course, the disks used in the VistaPak are not your run-of-the-mill, "plain-Jane" variety either.

As for the speed issue, several factors account for the dramatic improvement in access time and transfer rate. The higher bit density automatically adds a factor of two to the transfer rate. Spinning the disk slightly faster (360 rpm versus the normal 300 rpm) results in a speed-up of data transfer from less than 200K to 500K bits per second.

A special band position that can achieve a three-millisecond track-to-track stepping time is used to reduce access time. Special head positioning logic (more on this later) achieves a further reduction of the average access time (from any given track to another) to about eighty-five milliseconds. These figures also compare favorably to the forty-millisecond track-to-track and 460-millisecond average access time of the Disk II.

All of these improvements require careful design of the drive mechanism and associated electronics. For example, the high track density calls for a special head capable of reading and writing along a very narrow path (3.5 mils, or 0.0035-inch). The track-to-track spacing of 5.9 milliseconds approaches the magnitude of misalignment errors caused by off-center clamping of the disk or even by thermal expansion of the Mylar disk. If these errors were not corrected somehow, the chances of accurately and repeatedly reading data from such a dense format would be quite low.

To compensate for the expansion and contraction of the disk media, a small piece of Mylar is attached to the head carriage assembly. This "reference strip" contains a series of bands, some opaque and some transparent, which pass through an optical sensor. This "scale" is used to control the amount of travel the head makes between each track. Since the reference strip is made of the same material as a disk and is at the same temperature, it can accurately predict the proper space between tracks. Thus if the room temperature were suddenly to increase, the disk would expand slightly, pushing the tracks away from each other. This could cause the read/write head to follow along the edge of a track or, worse yet, to go between two tracks, instead of directly over the center of the track. But since the reference strip within the drive will also expand, it can correctly adapt the drive to the appropriate absolute track spacing. Further supporting this function is a microstepping technique that allows the drive to position the head to within 1/100 of a track, or 0.000059-inch!

What we've just been talking about also applies to another mechanism—the mechanism that corrects for any eccentricity in the track. Such eccentricity is usually caused by the normal tolerances of the clamping mechanism, which has some degree of "slop."

When a disk is first loaded into the drive, the head is moved out beyond the track 0 position to a special reference track. This track contains a special signal, which is placed on the disk at the time the VistaPak is manufactured. As the disk spins, the drive determines the absolute position of this track and remembers its position at eight points around the disk. If too much eccentricity becomes apparent, the drive immediately rejects, reloads, and reclamps the disk.

As you may have guessed by now, the V1200 performs these tasks with the help of its own internal microprocessor. This microprocessor also gives the V1200 the intelligence to perform a number of other housekeeping duties. For example, if the disk hasn't been accessed for about thirty seconds, the drive automatically goes out to the reference track to see if anything has changed. After a couple of minutes without use, the drive motor shuts off to reduce disk wear and ambient noise.

The microprocessor is also used to improve performance in certain areas, such as head positioning. As mentioned, the track-to-track step rate is three milliseconds per step; this is the standard rate used by most floppy disk (not minifloppy) and hard disk drives, and it represents the minimum time needed to move the head backward or forward one track reliably. The limiting factor here is the time needed to overcome the inertia of the head-positioning assembly and get it moving from a dead stop. Once the head is moving, however, it can be stepped at a much faster rate to cross multiple tracks. Therefore, if some sort of logic can be incorporated into the positioning mechanism, the time required to go from track

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0 to track 85 (halfway across the disk) can be dramatically reduced.

Apple disk drives have always used such a scheme to reduce access time. Apple Computer achieved this by directly controlling the head-positioning stepper motor from software. Thus the stepping algorithm and "seek rate" are stored in and controlled from DOS. And when higher-quality drives are used, such as those available now for the Apple, the DOS can easily be modified to seek the optimum rate for these drives.

Most other disk systems lack this capability and must step at a constant rate. By contrast, the V1200 uses its microprocessor to produce the most efficient head motion. If the drive receives step signals at a rate faster than three milliseconds, these pulses are stored in RAM and then dynamically examined by the microprocessor. A velocity profile is then derived to accelerate and then decelerate the head smoothly for the lowest possible access time.

Since the disk has 170 tracks, an "average" access would have to cross half, or 85, of the tracks. Without the dynamic positioning logic, this would take 85 times 3, or 255 milliseconds. The V1200 can perform this operation in only 85 milliseconds—or three times faster. Of course, this concern over milliseconds may seem foolish to some people. The degree of improvement certainly depends upon how much disk access is performed and how spread out the data is on the disk. Most files, in fact, are stored in contiguous blocks on adjoining tracks. Still, it's nice to know that the equipment is performing to its utmost, saving time whenever possible.

The final element of the V1200 hardware is the special controller card that interfaces the drive to the Apple. Actually, this card is the A-801 double-density, eight-inch disk controller card, which has been available from Vista for years. This card offers fast data transfer using DMA (direct memory access) and works with most full-size floppy disk drives. Thus, the V1200 drive simply appears to the controller card as five double-density disk drives (one for each platter).

Using DMA, the controller board can transfer data very rapidly from the disk into the Apple's RAM. It does this directly, without going through the Apple's 6502 cpu; that's one of the ways the V1200 manages to achieve a transfer rate of up to 50K bytes per second.

On the software side, the V1200 offers support for the Apple's three major operating systems. DOS 3.3 is supported, of course, and several DOS utility programs are included. One modifies Apple's FID program to work with the added storage of the V1200; another, called *Quick-charge*, speeds up DOS by a factor of about five. This utility is quite similar to other DOS speedups for the Apple and is necessary to realize fully the speed capability of the V1200.

After formatting the disks within the VistaPak using a special "VDOS," the V1200 acts like a regular drive. The familiar PR# command will boot the disk and it can be accessed by most software using the standard slot and drive parameters. The V1200 slot, however, appears to have five drives—D1 through D5. Since many protected programs, such as *VisiCalc*, cannot tolerate strange drives in slot 6, the recommended place for the V1200 is slot 5. The system can be cold-booted from the V1200 by simply pressing reset after turning on the computer and then typing PR#5.

Support for Apple Pascal is considerable and currently being updated. At present, only four of the V1200's disks are accessible and the system can't be booted from the V1200. Nevertheless, Pascal's intensive disk usage and memory swapping make the size and speed of the V1200 quite welcome.

As for CP/M, the V1200 installs it without a hitch but requires a 64K Apple. The drive assignments change depending upon whether the system is booted from a floppy disk or the V1200. The boot drive is always assigned to be drive A:, which is assumed by some programs to contain certain operating files. Thus it's wise to boot from whichever drive proves more convenient, but it's important to be consistent.

Most programs, except for nonstandard software as mentioned earlier, will work perfectly with the V1200. Even many of the special-purpose DOS patches can be successfully applied to VDOS. For example, the install program, which modifies DOS to date- and time-stamp files

using a Superclock II, works equally well on the V1200's VDOS.

Since the individual disks within the VistaPak, as well as the entire cartridge itself, are removable, data backup is extraordinarily easy. Using the supplied utilities, an entire platter can be duplicated without user intervention. Having a large RAM card makes this task relatively quick also.

Despite the added mechanics of the disk picker and the high-density storage, the V1200 has proven very reliable. Unless—or should we say *until*—hard disks with removable cartridges go down in price, the V1200 will remain an excellent choice for low-to-medium-cost, high-density storage with simple backup.

Novation Apple-Cat II. The Apple-Cat II from Novation is probably the most sophisticated modem available for the Apple II. The standard unit consists of a single peripheral board and a modular phone cable that plugs directly into the board at one end and into your phone jack at the other. Thus it is a direct-connect-type modem with a built-in phone line coupler.

The Apple-Cat is advertised as a 300/1200-baud modem; this is a bit misleading. The 1200-baud operation is only half duplex (Bell 202) and thus not compatible with the increasingly popular 212 standard of 1200-baud, full-duplex communication. Actually, the Apple-Cat can be expanded to operate on the 212 standard by the purchase of an additional board. For communicating with another Apple-Cat-equipped computer, the 202 mode can be used! As for the lower speeds, the modem uses the Bell 103 standard at 110, 150, or 300 baud.

The basic Apple-Cat contains no firmware, so a comprehensive communications program to operate the modem is included. Novation calls this communications program *Com-Ware*.

The functions offered by the current version of *Com-Ware* are numerous and useful. Among the standard features it provides are a buffer memory, auto-dialing, and memory/disk transfers. The auto-dial supports a disk-based phone directory list (with optional configuration setup for each number) and last number redial. A "keyboard to memory" function allows the creation of simple messages off-line without using a separate word processor. This message can then be sent at full speed after connection to the remote computer.

When transmitting files between two Apple-Cats, a high-speed (1200-baud) protocol that includes error-checking and automatic retransmission can be used. Other controls, such as memory on/off, local/remote echo, and so on, are also provided. The top two lines of the screen are always reserved for a status display. Even in the terminal mode, you get a constant indication of the line status, memory status, and other operating parameters.

Several utility programs are included with the *Com-Ware* package. These utilities can be used to convert Integer and Applesoft programs into binary or text files for transmission over the Apple-Cat; these files can then be converted back into their original Basic forms at the receiving end.

A wealth of options and accessories is available for the Apple-Cat. For starters, there's a handy expansion module that attaches to the back of the computer. This module provides a quick and neat connection for the phone line, handset, BSR controller, serial port, and tape recorder. There's also an "off-hook" indicator LED. The optional handset is just a standard telephone piece (tan-colored to match the Apple) that comes with two plastic supports. These supports slide into the Apple's ventilation slots, providing a convenient holder for the handset. Both the mouthpiece and earpiece are activated under software control. For example, the earpiece might be turned on when calling a remote computer, allowing you to tell if the line is busy or if there is some other problem. Once communication has been established, the receiver is turned off so you won't have to listen to all of the modem racket.

The Apple-Cat II has provisions for driving a printer or other serial device when the modem is not in use. An expansion module or an optional cable is required to connect the Apple-Cat to an RS-232 (DB-25) cable. The BSR option consists of a special wall transformer that plugs into an ac outlet and connects to the expansion module. This option, together with the appropriate software, enables the Apple-Cat to control lights, appliances, and other devices that are connected to BSR X-10 system control modules.

The cassette jacks on the expansion module open up the possibility of creating a very sophisticated telephone answering machine. The microphone and remote start/stop output should work with any tape recorder, making it possible to record the incoming audio off the telephone line. And for sending messages, the Apple-Cat contains an eight-bit DAC (digital-to-analog converter). Thus it's possible to transmit synthesized voice messages over the phone line by means of the Apple-Cat and user-supplied software.

Two more options that plug directly onto the Apple-Cat circuit board are available. The first is a Touch-Tone receiver chip, which can be added at any time. This IC allows the modem to decode the tones generated by pressing the buttons on a Touch-Tone phone. Thus, instead of having to use a terminal to call up your Apple, you could use any ordinary Touch-Tone phone (or even one of the pocket tone dialers) to control or enter data into the computer.

The other option is a software PROM that allows the Apple-Cat to be used directly, without the *Com-Ware* program. This firmware follows the same standard as the D.C. Hayes Micromodem II; thus, many Basic programs written for that modem can be used with the Apple-Cat. Since the hardware is completely different, however, most programs written in machine language will require modification to work with the Apple-Cat.

All in all, the Apple-Cat II is an exceptional product. It certainly has the potential for use in the creation of a sophisticated communications system. Its only drawback lies in its incompatibility with much of the existing software.

The Mirror. The Mirror is an EPROM from Rak-Ware that inserts into the firmware socket on the Apple-Cat II. It performs much the same function as the Novation firmware option, but with some improvements.

When dialing is taking place, the + symbol is recognized as a command to wait for another dial tone. Upper and lower case, including the popular one-wire shift key mod, is supported, and full compatibility with

most eighty-column boards is provided.

The Mirror can control a standard printer connected to slot 1. To avoid the loss of characters that can take place with some printers, a small buffer is used; in order to take advantage of this aspect of the Mirror, however, the printer you use should be able to operate at least as fast as the modem. The printer can be toggled on or off by means of simple commands.

SSM ModemCard. Another exciting modem designed expressly for the Apple II computer is the ModemCard from SSM Microcomputer Products. This direct-connect, 110/300-baud modem takes only seconds to install in the Apple. The board can be placed in any unused slot. Next, a standard, modular phone cable must be used to hook up the jack on the ModemCard to any convenient telephone outlet. Of course, a duplex adapter can be used if the modem is sharing the outlet with a normal technique.

Among the ModemCard's features are auto-answer/auto-dial, Touch-Tone or pulse dialing, audio monitoring through the computer's speaker, and on-board communications firmware. The firmware supports both a terminal mode and a remote mode. The command structure is totally compatible with that used by the Apple Communications Card and the D.C. Hayes Micromodem.

In the terminal mode, the ModemCard lets you dial a remote computer, establish a connection, and then use the Apple as a "mostly dumb terminal." When the number to be dialed is being specified, the ModemCard recognizes five special characters in addition to the numerical digits. An asterisk included in a number causes the modem to pause for two seconds at that point. This can be used to ensure sufficient time for acquiring an outside line from a PBX system or the local access tone from a long-distance carrier such as Sprint or MCI. The other four characters let you select tone dialing or pulse dialing, and activate or silence the audio monitoring feature.

When the monitor has been activated, the Apple's built-in speaker is used as a crude but functional monitor of what's happening on the line. It's not hard to distinguish between a dead line, one that is ringing, and one that is busy. (In fact, although the speaker is not intended for voice quality, it is often quite possible to recognize the familiar sound of a "wrong number" or "not in service" recording. Worse yet, you might sometimes hear the crackle of some human answering, "Hello . . . hello . . . HELLO! . . .") Most people will find this audio monitoring extremely valuable—especially when they're trying to reach a popular computer system that's often busy.

All of the terminal mode commands follow the standard set by the Apple Communications Card and the Hayes Micromodem. Thus, each command begins with a control-A, for attention, followed by a command code. For example, control-A, control-F selects the full duplex mode, control-A 1 selects 110 baud, and so on.

In the remote mode, the Apple is left on with the modem active. When the ModemCard receives a call from a remote terminal or computer, it answers the line and then places the Apple under control of the remote terminal. Thus you can load programs from the disk, list and/or modify them, and then run them from the remote location. Of course, any programs using graphics or direct access to Apple hardware, such as the keyboard, screen, and speaker, won't lend themselves to remote operation.

As mentioned earlier, most of the commands are similar to those used by the Hayes Micromodem II. A concerted effort was made to keep the ModemCard compatible with the Micromodem II. This compatibility goes beyond the firmware interface, however. At the hardware level, even the data and status ports have been mapped to the identical locations as those of the Micromodem II. This should ensure that almost all software written for the Hayes modem will work with the ModemCard. With all of its added features, and its low price, the SSM ModemCard has to be considered an exceptional value. ■

Novation, 18644 Oxnard Street, Tarzana, CA 91356; (213) 996-5060. Rak-Ware, 41 Ralph Road, West Orange, NJ 07052; (201) 325-1885. SSM Microcomputer Products, 2190 Paragon Drive, San Jose, CA 95131; (408) 946-7400. Vista Computer Company, 1317 East Edinger, Santa Ana, CA 92705; (714) 953-0523.

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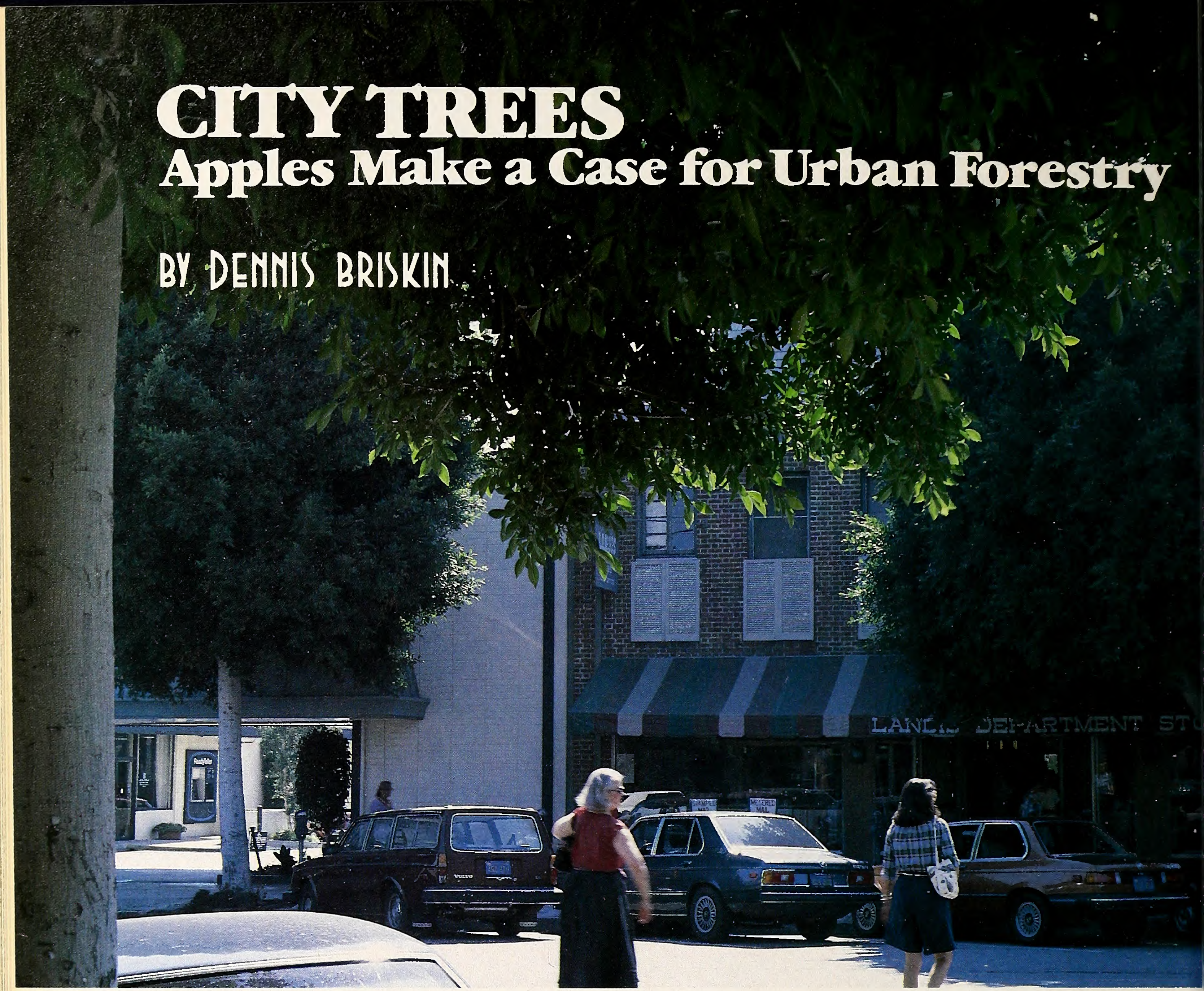
CITY TREES
Apples Make a Case for Urban Forestry

BY DENNIS BRISKIN



If knowledge is power, then knowledge of numbers may well sit atop the pyramid of power. The story of Magic, Inc., a small California citizens' group, suggests that low-cost microcomputing is bringing to public activists the "power of the number" the way the printing press brought to our ancestors the power of the word.

Magic is a group of concerned citizens in Palo Alto, California, who have combined intelligence, a passionate commitment to an ideal, the power of an Apple II, and a home-brewed forest-management program to persuade their city's government to increase the rate at which it plants trees along the streets. Magic's forest-modeling program enables an urban forester to choose the correct mix of tree species and yearly planting rates to achieve a predetermined shade standard and a stable tree population.

Sitting at the northern edge of Santa Clara County, thirty-five miles south of San Francisco, Palo Alto is named for a tall old redwood tree, whose triangular shape appears on the city seal. Palo Alto is home to a strongly vocal, environmentally conscious population of sixty thousand.

Team Effort. Magic is a collection of self-described human ecologists. David Schrom has been the conceptual force and political strategist as the four-year-old group has moved through the process of attending public meetings and seeking support and approval for various projects. A Yale Law School graduate who wrote on his entrance application that he intended never to practice law (which he has not), Schrom is quick-thinking and articulate.

Erica Prince, president of Magic, is an undergraduate student in biology at Stanford University who prefers to be thought of as a neighborhood organizer. Jeffrey Hook serves as Magic's computer programmer. Like the others, he has no special training in forestry but learned what he knows about trees through independent research. In addition to earning a degree in German literature from Stanford, Hook spent nine months studying electronics at Bay Valley Technical College in nearby Santa Clara.

Hook, Prince, Schrom, Magic member Daniel Bartsch, and Magic cofounder Corinne Powell live together in a plain white stucco house owned by Powell. Located on a corner lot in the Evergreen Park section of Palo Alto, the house is surrounded by fruit trees and vegetable gardens.

Strip Trees. Magic's involvement with the city and the tree program began in 1979 when Schrom and roommates planted some fruit trees in the narrow strip of land between the sidewalk and the street outside their house.

"We looked up and down and saw a fairly barren street with virtually no healthy young trees on it," Schrom says. "We thought that was crazy. The reason I care about the trees is that I came back here after a vacation once feeling as though I had been living as a transient in Palo Alto for ten years, always threatening to move to some idyllic place in the country. I decided to start living here, instead of taking from this community in anticipation of going to another place."

The City of Palo Alto put local ordinances ahead of individual idealism. Schrom got a letter signed by an assistant district attorney saying, "If you don't take out the trees we're going to remove them at your expense and put a lien on the property." The letter said it was illegal for

citizens to plant trees in the narrow strips.

Schrom knew more than enough law to know they were over-matched in a legal struggle with the city. The trees came out. But so did Schrom.

Schrom and his roommates called the city attorney, who referred them to the tree maintenance division, who referred them to something called the Palo Alto Tree Committee, which hadn't met in six months. But a meeting was scheduled in the near future. While waiting for that meeting, Schrom did what you would expect of someone with his background; with the help of a friendly research librarian, he read everything he could find on urban forestry.

He wound up with "a stack of two hundred articles and fifty books" and sat down with it for two weeks. By the time Schrom was finished he had found two local foresters he wanted to talk with: Greg D'Ambrosio in Carmel and Tony Acosta in Oakland. Schrom also found a group in Oakland doing a neighborhood tree-organizing project, as well as some folks in Los Angeles who called themselves the Tree People.

Tree Questions. Schrom, newly armed with knowledge, went to the fall Palo Alto Tree Committee meeting and started asking questions. He asked the committee members if they had any idea how many trees were being planted in the city; their answer was no.

"I asked them if they cared and they said, 'Why?' I said, 'Because all these big old trees are going to die someday.' They said, 'That won't happen for a long time.' "

Through a friend of theirs at the California Department of Forestry, Schrom and Magic also discovered a state grant program for citizens' groups who wanted to plant trees in public places. In the first half of 1981 Magic received $12,000 to plant one hundred street trees and prepare a public educational slide show on trees in the city.

Schrom continued going to the tree committee meetings and asking questions, and he soon got himself elected chairman of the group. He had found a city that couldn't see the forest for the trees.

Magic was alarmed that the planting rates were so low. "The best estimate we got from the city staff was that they were planting one hundred fifty trees per year," Erica Prince says. Later the city staff proposed to raise that to a rate of seven hundred fifty trees per year, which Magic thought was still too low.

Prince explains their concern by pointing out that a stable forest requires that maintenance remain constant from year to year and that the forest does not cycle in growth from lush to sparse to lush.

"What we have now is a forest that works in terms of the number of trees and their size and age. But these trees are going to die out and we are not planting enough to replace them. Also, there may come a point when they are all replaced, but with small trees. It's not fair to future generations to present them with a forest without stabilizing it by evening out the age distribution," she says.

Magic is also alarmed that the wrong trees are being planted in the wrong places. "There is an overreliance on a handful of species," Schrom says. In the thirties and forties, magnolias and sycamores were planted. In the fifties and sixties, the city planted modesto ashe and liquidambars. In the seventies, hardly a tree was planted. Now, in the eighties, everyone wants to plant Chinese pistaches, holly oaks, and liquidam-

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Jeffrey Hook, David Schrom, and Corinne Powell of Magic, Inc., prepare to plant a tree on a thin strip of land bordering a Palo Alto street.

bars, says Schrom. "Failure to construct the forest according to a set of ecological principles is going to lead to the same disappointment in the future that we feel today over actions taken in the past," he continues.

He believes that any monoculture is vulnerable. If some pathogen comes along, it just moves from tree to tree straight through the neighborhood. Not only has the city planted the same species, but it has planted those trees' clones, says Schrom.

"You have exactly the same genetic material on every single tree up and down the block. To a landscape architect it looks beautiful. But to the ecologist it looks like a disaster waiting to happen."

Schrom cites the experience of some eastern and midwestern cities whose tree populations suffered from Dutch elm disease. "There were plenty of hundred-year-old elm trees twenty to thirty years ago. When Dutch elm disease arrived it was good-bye elms and hello treeless cities."

Planning an Apple Orchard. Not given to labeling a problem and walking away from the task of finding a solution, Magic began pushing for increasing planting rates and species variety. While the group was playing with the numbers by hand, technology and the company's Silicon Valley location caught up with them. In late 1981 Ellen Nadler, a former law school classmate of Schrom's, read some of his writing and said, "You need a word processor." Another friend, Jerry Kaplan, said, "What you need is a computer."

With financial help from Nadler, Magic bought an Apple II Plus with 64K of memory, a Pascal card, and an eighty-column card. "We've been happy with it," Schrom says, adding that they have nothing to compare it with. After an early taste of computing, they are hungry for more. "Some hotshot word processing program would be an enormous help. That's for me personally. Also graphics. We have some sort of graphics buried in the computer, but we have yet to coax it out," he says with a laugh.

The story of the tree-modeling program itself begins with Prince's work in a Stanford class called "Policy Decision Making Regarding the Environment." When a ten-page paper was assigned, she asked for permission to write about her work with the tree program in her neighborhood. One thing led to another.

"I thought I was just going to do some kind of critique of the tree plan," she says. "But then we started getting more excited about doing an original paper using the computer. I began one morning hashing out some different ideas about forest size, stability, and necessary planting rates."

"It was easy enough to write a model that was hand-crankable," says Schrom. "Once we had it reduced to something that a human being might do with hand calculations, we then just made it a series of calculations by a machine."

Credit for writing the actual program goes to Hook. When Magic first got the Apple, Hook didn't know how to do anything on it. In time-honored fashion, he simply began leafing through the manuals, figuring out how to use the Apple's standard features—like text editing and file management.

Tree Programming Months. Working ten hours a week, Hook spent three months developing the forest management model program. The forest manager who uses it must determine how many miles of pavement are in his city and decide what percentage of the pavement he wants to shade. Next, the forester must specify either how many trees he wants in the forest or the distance between the trees. Finally, the model asks him to choose up to twelve different tree types and to estimate such factors as their growth rate, shape, and expected useful life.

From this data the model calculates the percentage of the pavement that would be shaded at noon on June 21 at the city's latitude and how many trees of each type would have to be planted and removed every year to maintain a stable forest. Another piece of software (not yet written) will compute the cost of the forest modeled.

Prince acknowledges an unavoidable limitation in the forest modeling program: No one can say exactly how long trees will live, especially before they are in the ground.

"It's a really controversial issue," she says, "because foresters have not been keeping records long enough to have good data to draw on. They have their own eyes and their experience. They can see what's dying."

What she and the others stress is the necessity that the yearly plant-

ing rate be derived by dividing the number of trees in the forest by the average life expectancy of the trees. For example, to have a forest of one hundred thousand trees living an average of fifty years requires a yearly planting rate of two thousand trees.

A printout from the forest-model program shows how using the planting rate of seven hundred fifty trees per year proposed by the city arborist would eventually have left the city with fifty-four thousand trees—roughly half the number it has now, with only 32 percent of the pavement shaded. A task-force report recently adopted by the city calls for 50 percent shade coverage.

VisiTrees. Like a well-known electronic spreadsheet program, the forest-modeling program allows the user to ask "What if?"

"Suppose the trees can be made to grow faster?" Schrom says. "Or suppose we plant only trees that will live to be one hundred years old? We have learned about the consequences of all kinds of different management decisions. The machine is much faster than we are. We were able to go through half a dozen versions of the forest ourselves, but the computer does in minutes what took us days."

Besides being faster, the computer has increased Magic's credibility. "We are speaking beyond our credentials," Schrom says, recognizing that a nonpracticing lawyer, a Stanford undergraduate in biology, and a German scholar lacking the proper training in electronics cannot easily command respect as "urban foresters."

"The nice thing about the modeling program is that we can get past the point where we're debating how long the trees are going to live or how big they're going to get," Schrom says. "We can just say, 'Okay, let's assume all that's true. Then what happens?' We've been confronted by people who've been making wildly optimistic assumptions, which were inadequate to support the existing policy. Now we have a machine with which we can demonstrate various plans using a computer that does not have a bias toward our point of view."

Schrom wants to show the people of Palo Alto the consequences of several alternative courses of action. Some of those courses will be better than others, depending on the wishes of the community. Most important to Schrom is that the decision be a community choice and that it be an informed choice. And that they have some mechanism (like the model) for keeping it both.

The Authoritrees Respond. Palo Alto city officials have responded cautiously to the output from Magic's forest modeling efforts. City council member and former mayor Fred Eyerley says the city will use data processing technology in its tree survey scheduled to be done over the next fifteen years. Magic and other neighborhood groups have pushed for accelerating the detailed tree survey in order to have the information sooner. Eyerley is a forester trained at the University of Oregon, and he says that Magic's approach seems like a good one.

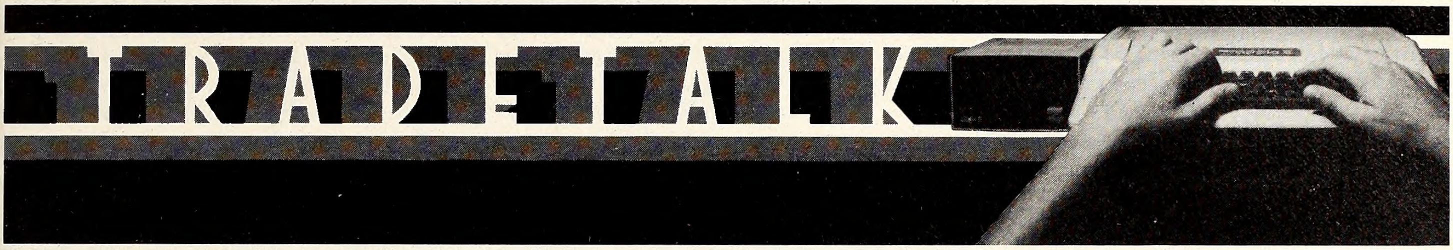
At a late May meeting the Palo Alto city council adopted a tree-management program calling for planting seventy-five hundred trees over the next six years. Although the number is smaller than hoped for, the Magic people are looking on the bright side.

"The management plan as first submitted set the annual planting rate at seven hundred fifty trees," Schrom said after the council meeting. "As a result of the model we generated, which was in the hands of the city staff and council members at the meeting, they upped their planting rate by five hundred trees a year. This is a dramatic shift.

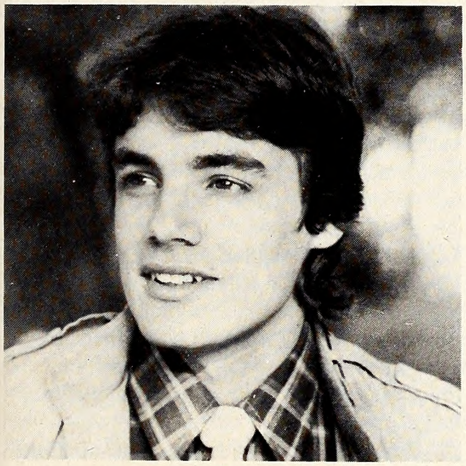
"A lot of people who know what goes into a model like this and the kind of service one can get from it are looking at the model and seeing that we can be taken seriously."

In case there's any doubt that machines like the Apple will be as revolutionary as the printing press, the story of Magic foretells that widespread access to the ability to collect, store, and manipulate numbers appears certain to change at least the process of political and social decision making.

Note: If you'd like to have a copy of the forest-modeling program, Magic will send you one in exchange for a blank 5¼-inch disk and a ten-dollar tax-deductible donation. Write to Magic, Inc., Box 5894, Stanford, CA 94305. For more information, call (415) 326-5566.



☐ In a move that may shape the industry for years to come, **MicroPro International** (San Rafael, CA) has filed suit against a software rental company. MicroPro, maker of *WordStar*, is charging **United Computer** (Culver City, CA) with copyright infringement. The suit, filed in U.S. District Court in San Francisco, claims that United Computer removes the license agreement from MicroPro software packages, repackages them, and rents them for 15 to 25 percent of the suggested retail price. MicroPro is asking $14 million in punitive damages and $50,000 for each copyright infringement of its software products. "It is abundantly clear that the company is renting software programs so that customers can illegally copy them," said E. Ric Giardina, general counsel for MicroPro. Giardina said that he expects other software manufacturers to follow the MicroPro lead in filing suit against United Computer and other software rental firms. MicroPro and Digital Research were awarded $250,000 in a similar case last fall in which they charged Dataforce International with illegal copying of software programs.



Todd M. Porter, vice president of Microlon's software division.

☐ **Microlon** (San Marcos, TX) has announced the appointment of **Todd M. Porter** as vice president of its new software division. Porter was previously a consultant and programmer at Penguin (Geneva, IL), where he helped create the graphics for *Spy's Demise*. Porter's other credits include the graphics for a Xerox commercial and graphics for *Armchair Quarterback*, a pilot game show that will air this fall. The aim of the new software division is to give young, advanced programmers a chance to submit their programs to Microlon for evaluation and possible publication.

☐ Under an agreement signed between **Ultrasoft** (Bellevue, WA) and **Broderbund** (San Rafael, CA), the latter company will be releasing Atari and Commodore 64 versions of two Ultrasoft adventures—*Mask of the Sun* and *Serpent's Star*. **Doug Carlston**, president of Broderbund, said he hopes in the future Broderbund will be able to publish more programs created by Ultrasoft. In other Ultrasoft news, the company is now making a minority equity position available to generate capital, said **Larry Franks**, general manager.

☐ **Softsel Computer Products** (Inglewood, CA) will sponsor comprehensive software-dealer training programs, president **Robert S. Leff** announced at the Consumer Electronics Show in Chicago this past June. Softeach: The Software Training Forum will consist of multivendor training forums in four cities and will be offered free to Softsel dealers. The two-day forums, to be held in Los Angeles, New York, Chicago, and Dallas, will feature seminars conducted by Lotus, Microsoft, VisiCorp, MicroPro, Ashton-Tate, Digital Research, Spinnaker, Sierra On-Line, Datamost, Micro Lab, Continental, and other software companies. The seminars will focus on explanations of product features and on techniques to sell products more effectively.

Softsel has also opened a forty-two-thousand-square-foot regional sales, service, and warehouse facility in Chicago. Regional sales offices will be added in Seattle, Minneapolis, and Washington, D.C., this summer, and warehouses comparable to the Chicago facility will be opened in Atlanta and Dallas next year. According to **David Blumstein**, vice president of Softsel, the expansion is part of Softsel's long-range plan to decentralize its support to retailers. "Our new Chicago operation will allow us to ship software to our Midwest customers even more quickly and inexpensively," said Blumstein. "We'll also be able to offer them on-site training plus the fast, personal response a localized sales and service staff can provide."

☐ **Apple Computer** (Cupertino, CA) is offering kits for organizing computer clubs to ten thousand elementary and secondary schools nationwide. To obtain a computer-club kit, schools must send to Apple a letter written on school stationery and signed by the school's principal. The name of an adult sponsor who is willing to advise at least twelve interested students also must be included.

Apple is also sponsoring a competition in which computer clubs and individual elementary-school students will compete for travel, cash, and computer equipment worth more than $100,000. Entrants are encouraged to submit projects in which they use microcomputers to serve the community. Entries will be evaluated by independent judges selected for their prominence in the computer and education fields. Competition finalists will be flown to Washington, D.C., where the winners will be named.

Apple Computer is now giving grants to community organizations across the country to establish information networks based on microcomputers. The first grants, valued at more than $206,000, were given to eight networks whose interests range from infant health care to employment opportunities for older citizens. Through the networks, organizations providing similar services are linked together by computer, enabling them to share information and resources. Apple reviews network proposals and awards grants quarterly. A proposed network is evaluated on the benefits it provides to the community, its suitability for microcomputers, and its sustainability. Winning community organizations are provided with computer equipment, computer accessories, software, and computer training.

☐ **ComputerLand** (Hayward, CA) has filed suit in federal court seeking an injunction to prevent **Softwareland** (Scottsdale, AZ) from using the word "land" in its name. Three Softwareland stores, which were launched at Comdex/Spring in Atlanta, are the first in a projected network of retail stores, said **Taylor Coleman**, president of Softwareland.

☐ **Scholastic** (New York, NY) has announced the appointment of **Harold L. Leddy** as advertising director of *Family Computing*, the company's first national consumer magazine. Leddy was previously the U.S. advertising director for Newsweek International. Scholastic also has appointed **Mary Dalheim** as editor of *Teaching and Computers*, its new magazine for elementary-school teachers. Dalheim is the former editor of *Instructor* magazine, another Scholastic publication. In other appointments, **Roger Buoy** has been named executive vice president in charge of software development. Before joining Scholastic, Buoy was a partner in Arthur Young and Company, a public accounting firm.

☐ **Sterling Swift Publishing** (Austin, TX) has announced the release of its *1983-1984 Swift's Educational Software Directory—Apple II Edition*. Apple Computer chose the directory for inclusion in its Kids Can't Wait program and distributed the directory, along with Apple II computers, to approximately ninety-five hundred California schools. The directory has 90 percent more software listings than last year and has an enhanced format for entries.

☐ Whoever said that you can't combine business and pleasure? This spring at Comdex, **State of the Art** demonstrated that it is possible, as the firm hosted three hundred dealers at an evening game between the Atlanta Braves and the Philadelphia Phillies. According to **John Carrington**, State of the Art vice president, "We started planning a booth for Comdex this year but decided instead to treat our dealers who helped us achieve our significant success during the past year." As a souvenir of the evening, each guest received a baseball autographed by the Braves players.

☐ **ComputerCraft** (Houston, TX) has merged with **ComputerWares** (Dallas, TX). The merger of the two retail computer chains brings to nineteen the number of ComputerCraft stores in Houston and Dallas. The company is now evaluating acquisitions in other parts of Texas, as well as in Oklahoma and Louisiana, ComputerCraft president **Avery More** said.

☐ **Continental Software** (Los Angeles, CA) has named **Gerald Lewis** director of software development. Prior to joining Continental, he was a system analyst and software documentation consultant. Lewis will be responsible for evaluating and selecting software under consideration for publication, said Continental's president, **James Sadlier**.

☐ **Novation** has a new address: 20409 Prairie Street, Chatsworth, CA 91311. The phone number is unchanged.

☐ **Innovative Computer Products** (Chatsworth, CA) has changed its name to **Perfect-Data**. The six-year-old company specializes in the design, manufacture, and marketing of computer-care products—equipment, supplies, and accessories.

☐ **Random House** (New York, NY) has announced the appointment of **Sandy Grafton** as managing editor of microcomputer courseware development for its school division. Grafton was formerly project editor of electronic learning projects at Developmental Learning Materials in Allen, Texas.

☐ **SSM Microcomputer Products** (San Jose, CA), a manufacturer of interface boards for the Apple, has announced a new addition to its corporate family. **Julian Olson** has joined as national sales manager. Olson was previously a minicomputer salesman with Digital Equipment Corporation.

☐ **Michael Dean**, president of **Infosoft Computer Systems** (Concord, CA), has announced the appointment of **Per Svendsen** as general sales manager. Svendsen will direct all sales efforts for Infosoft, an independent retailer that specializes in integrated systems for small businesses.

☐ **Orange Micro** (Anaheim, CA) has announced the addition of **Alan Button** as director of sales. Button previously worked for Digital Equipment Corporation.

☐ In a final note on this month's movers and shakers, **Marsha Adams** has joined **Microscience International** (Palo Alto, CA) as director of marketing. Adams previously served as a marketing consultant to several San Francisco-area firms, including Transamerica and Lucasfilm. May the Force be with her.

All About Applesoft

by Doug Carlston

Our final Applesoft project is one that requires an understanding of the way Applesoft is stored in the Apple. We are going to build a program that graphs mathematical functions that we enter from the keyboard. To do this, we'll have to accept the function as an input string, convert it into the key codes of Applesoft, and then poke it directly into the Apple's memory so that the string becomes a part of the Applesoft program.

We'll start this program off just like many others, by jumping over the subroutine area to line 500 and setting up a menu:

```
10   GOTO 500
500  REM *****************
501  REM  MAIN MENU
502  REM *****************
505  ONERR GOTO 2000
510  HOME :A$ = "GRAPHING PROGRAM": GOSUB 50
520  VTAB 8: HTAB 10: PRINT "E(NTER FORMULA": PRINT : HTAB
     10: PRINT "G(RAPH FORMULA": PRINT : PRINT : HTAB 10
530  GET A$: IF A$ < > "E" AND A$ < > "G" THEN 530
540  IF A$ = "G" THEN 1000
```

We're going to trap our own errors at line 2000 (trying in particular to avoid program interruption from division by zero errors). And we're going to use our usual centering subroutine to put up a title:

```
50   VTAB 1: HTAB 1: IF LEN (A$) < 39 THEN HTAB 20 – LEN (A$) / 2
55   INVERSE : PRINT A$: NORMAL : RETURN
```

As you can see from the menu section, this little program has only two parts. The first permits us to input a formula; the second allows us to graph it. Let's take a look at the input routine first.

We want to print "Y = " and then leave a blinking cursor, waiting for the user to complete the expression (so as to leave no doubt in the user's mind as to the form of the expression). When the user completes the line and presses return, we will store the entire line in the string FM$ (for formula).

Then we'll take the string FM$ apart and convert it into tokenized Applesoft by taking any parts that are Applesoft commands and replacing them with their token values. Once converted, the string will be poked into a place in the program where it can be treated as just another Applesoft line.

Probably the first thing we should do, then, is figure out where we are going to poke this new line of Applesoft. Last month we suggested putting the line near the beginning of the program so that its address in memory would stay the same even if we changed parts of the program. We also suggested that a dummy line could be set up using colons. In Applesoft the colon just means "Now here comes a brand-new line of Applesoft." Saying that repeatedly shouldn't do any harm.

So let's add a new subroutine at the very beginning of the program:

```
20   ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
25   RETURN
```

It doesn't say much now but just wait! (Make certain, by the way, that you include enough colons in line 20—keep typing until the warning bell sounds.)

The first thing we need to find out is the address in memory of the first colon in line 20. We should be able to figure it out by counting: five header bytes to line 10, plus a token for goto and three digits in 500. Add to that the five header bytes to line 20 and we should be pretty sure that the first colon will have an address 5 + 1 + 3 + 5 = 14 bytes from the start of the program. Since Applesoft programs ordinarily load at address 2048, the first colon should appear at address 2062.

Of course, there's an easy way to check:

```
FOR X = 2048 TO 2100: PRINT X;"  ";CHR$ (PEEK(X)),: NEXT
```

So now we know where to poke. All that remains is to figure out what to poke. Let's start writing the input routine:

```
600  REM *** INPUT FORMULA ***
610  VTAB 8: HTAB 8: CALL – 958: PRINT FM$
620  VTAB 12: HTAB 8: INPUT "Y = ";A$
```

Line 610 clears everything on the screen except for the title. It also prints the current value of FM$, in case this is not the first time through the program. Line 620 gets the user's input. Now, what do we do with it?

If the user just wants to come to this section to review his formula, he should be able to leave without having to type it in all over again. If, on the other hand, he has typed in a new formula, we should start processing. Let's figure out which situation we are in:

```
630  IF A$ = "" THEN 500
```

Assuming that A$ is equal to something, it's time to put the new formula into the subroutine at line 20. First, let's make up our string FM$:

```
640  FM$ = "Y = " + A$
```

The next step may seem a little peculiar. Now we have to poke colons into line 20:

```
650  FOR X = 1 TO 116: POKE 2061 + X,58: NEXT
```

The reason we do this is so that, if we are using this routine more than once, we will not accidentally enter a short formula only to find the tail end of the previous, longer formula appended at the end of line 20!

Our next step is to poke the entire string into line 20 without worrying about tokens for the moment:

```
660  FOR X = 1 TO LEN (FM$): POKE 2061 + X, ASC ( MID$
     (FM$,X,1)): NEXT
```

Unfortunately, the various mathematical symbols such as =, *, /, and the like are not represented in Applesoft by their ASCII values. If they were, we would be finished. Instead, they are represented by other numbers called *tokens*—a list of these tokens can be found in Appendix F of Apple's Applesoft manual. So now we have to figure out when and where to replace the ASCII values we poked with token values:

```
670  FOR X = 1 TO LEN (FM$):A = ASC ( MID$ (FM$,X,1)): IF (A >
     41 and A < 48) OR A = 94 OR (A > 59 AND A < 63) THEN 690
680  NEXT : GOTO 500
```

This is not necessarily the most elegant way to do it, but it works. Look over the list of tokens and mark down the items we have to tokenize. Note, incidentally, that the system we are using allows us to use only one-character keywords like =. If we tried to use the trig functions, we would already have poked three separate characters into line 20, and replacing the three with one token would be a major chore.

There should be eight keywords on your list. Now let's look at the ASCII character codes in Appendix K and find out where these eight characters stand.

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Keyword	+	−	*	/	^	>	=	<
ASCII	43	45	42	47	94	62	61	60
Token	200	201	202	203	204	207	208	209

All our routine needs to do is find any characters in FM$ that have any of these ASCII values and poke the corresponding token value into the correct spot in subroutine 20. This isn't hard at all:

```
690  RESTORE
700  READ B,C: IF A = B THEN POKE 2061 + X,C: GOTO 680
710  GOTO 700
720  DATA 42,202,43,200,44,44,45,201,46,46,47,203,60,209,61,
     208,62,207,94,204
```

We took each pair of numbers and put them into the data statement. Line 700 reads them out, one pair at a time, compares the first number in each pair with the ASCII value of the character selected by line 670, and, if there is a match, pokes the second value in the pair into subroutine 20.

After all that, the graphing portion of this program is going to look trivial:

```
1000  HGR2 : HCOLOR= 1: HPLOT 0,95 TO 279,95: HPLOT 141,0
      TO 141,191: HCOLOR= 3
```

First we turn on the graphics page and plot the X and Y axes in green. Then we plot the formula curve in white:

```
1010  FOR X = − 139 TO 139.
1020  GOSUB 20
1030  IF Y< − 96 OR Y > 95 THEN FLAG = 0: GOTO 1050
1040  IF FLAG THEN HPLOT TO X + 140,95 − Y: GOTO 1050
1045  FLAG = 1: HPLOT X + 140,95 − Y
1050  NEXT : GET A$: TEXT :FLAG = 0:Y = 0: GOTO 500
```

As usual, the most complicated part of this comes from taking measures to ensure that both the X and the Y values are within allowable ranges. We don't have to worry much about X; we have complete control over it. However, the value of Y depends entirely upon the function the user has entered in line 20. When the plot is entirely within legal bounds, we like to use the hplot to command, because it connects the dots and makes a smoother graph. However, when something has gone completely off the chart, we have to start plotting with an hplot command when it first comes back on the chart. That's why we use the variable FLAG as we do.

Note also that we have inverted the value of Y so that it will plot the low values of Y at the bottom of the screen rather than at the top.

All that remains is to write our error-trapping routine. Our main concern is that users will write functions involving division by zero at some point: Y = 100/X. Rather than aborting the whole program at that point, it would be better if the program skipped that one point and continued. So let's write an error routine that advances the value of X, checks again for legitimacy, and then resumes normal operation:

```
2000  HPLOT X + 140,0:X = X + 1: POKE 216,0: ONERR GOTO
      2000
2010  IF X > 139 THEN POP: GOTO 1050
2020  RESUME
```

We have the routine plot a dot at the top of the screen so that we can monitor what's going on. It then increments X, turns off the error flag, and resumes normal activity.

Sometimes, incrementing X doesn't solve the problem. Imagine, for example, that the user entered Y = X/Y. Since Y has an initial value of zero, this formula will be in error regardless of the value of X. Therefore, we do have to have some way of leaving subroutine 20 after an appropriate amount of time. That's what line 2010 does—it gets us out of the subroutine gracefully and lands us at the end of the the for-next loop, whence we can exit to the main menu without leaving any unfinished business (either subroutine or loop) lying about in the stack.

Your Mission—Explore the Applesoft Frontier. This is the last program we are going to be privileged to share with one another. This column was intended to take you through Applesoft in a way that would encourage you to continue your explorations on your own. It's a wonderful language, and if you've been a regular reader since January 1982, you've had a chance to play with virtually every command in the language. But now's the acid test. Off come the training wheels.

Now that you know the words, let's see what you have to say.

THE BASIC Solution

By Wm. V. R. Smith

This month's Basic Solution presents a program that will help a small business track accounting information in a couple of important areas. It is written as a sales ledger that allows you to enter amounts for individual invoices and disburse the total among a number of different accounts, such as cash sales, accounts receivable, sales taxes, and so on.

Many small businesses, even if they use a computer for other applications, are reluctant to convert their entire accounting systems to computer. This program may be a good starting place for such a change because it doesn't try to convert a whole system at once.

When you run the program you get a menu like so:

```
A   Name invoice file
B   Invoice entry
C   Print invoice file
D   Exit
```

The first thing you have to do is name your file; the program won't let you enter an invoice or print a file until it knows what file to perform those operations on. When you select the first option, the program catalogs the disk, and you can either select an existing file from the catalog or create a new one by typing in a new file name.

If you choose to create a new one, you will be asked to specify the accounts to which money entered into the new file may be disbursed. The default accounts appear in the data statements at the end of the program. You can enter different ones either by adding them to the end of the offered list while running the program or by changing the defaults in the data statements. Be sure to change the number in line 9999 if you change the number of default accounts.

Once the program has an invoice file to work with, you can enter invoices or print the file. When you want to enter an invoice, the computer prompts you for an invoice number, a date, an amount, the client's name, and any comment you might want to add. When this data is entered and confirmed, the computer asks you to break down the total from the invoice into the separate accounts.

When you select the print-file option from the menu, the computer prints all the data from that file, breaking the totals into the separate accounts and then printing the account totals.

You can adapt the program to keep track of check disbursements or other accounting information by changing the appropriate accounts and a few of the prompts.

Good luck with your programming.

```
1 REM ********************************
2 REM *
3 REM * CASH LEDGER
4 REM *
5 REM ********************************
15 DIM TITLE$(20),CUST(20),SUB(20),
   GN(20),ROYAL(20)
20 RESTORE : READ ITEM
25 FOR I = 1 TO ITEM: READ TITLE$(I),
   ROYAL(I): NEXT
30 D$ = CHR$ (4)
40 PRINT D$;"NOMON I,O,C"
50 HT$ = CHR$ (27) + CHR$ (9):VT$ =
   CHR$ (27) + CHR$ (11)
100 REM ******************************
110 REM * MENU
120 REM ******************************
130 HOME : HTAB 15: PRINT
    "*** MENU ***"
135 VTAB 2: PRINT "   CASH LEDGER"
140 VTAB 9: PRINT "SELECT FUNCTION:"
150 VTAB 11: HTAB 10: PRINT "A   NAME
    INVOICE FILE"
160 HTAB 10: PRINT "B   INVOICE ENTRY"
170 HTAB 10: PRINT "C  PRINT INVOICE
    FILE"
175 HTAB 10: PRINT "D   EXIT PROGRAM"
180 VTAB 20: HTAB 1: PRINT "PRESS
    A,B,C OR D :";: GET A$: PRINT
190 A = ASC (A$) - 64
215 IF FG = 0 AND A < > 1 AND A < > 4
    THEN 100
220 ON A GOTO 500,1000,4000,300
230 GOTO 180
300 TEXT : HOME : END
500 REM ******************************
510 REM * DEFINE FILE NAME
520 REM ******************************
525 FG = 1
530 HOME
540 HTAB 7: PRINT "*** DEFINE FILE
```

```
     NAME ***"
545  INPUT "HIT RETURN TO CATALOG
     DISK";TEMP$
547  PRINT CHR$ (4);"CATALOG"
550  INPUT "ENTER THE FILE
     NAME ?  ";FILE$
560  IF LEN (FILE$) = 0 THEN 550
570  PRINT "FILENAME: ";FILE$
580  INPUT "IS THIS CORRECT (Y/N)
     ?";TEMP$
590  IF LEN (TEMP$) = 0 THEN 580
600  IF LEFT$ (TEMP$,1) < > "Y" THEN 530
610  FOUND = 1:BAD = 0
620  ONERR GOTO 650
630  PRINT D$;"LOCK ";FILE$;",V0"
640  GOTO 660
650  FOUND = 0
660  POKE 216,0: REM CANCEL ONERR
     GOTO
670  IF FOUND THEN 800
680  HOME : PRINT FILE$;" DOES NOT
     EXIST!": PRINT
690  VTAB 4: INPUT "CREATE A NEW
     FILE  ?  ";TEMP$
700  IF TEMP$ = "" THEN 690
710  IF LEFT$ (TEMP$,1) < > "Y" THEN 100
715  HOME : HTAB 8: PRINT "*** FILE
     DEFINITION ***"
716  VTAB 4: PRINT "ENTER THE NAMES
     OF ACCOUNTS": PRINT : PRINT
     "ENTER '";: FLASH : PRINT "DONE";:
     NORMAL : PRINT "' WHEN FINISHED"
717  ITEM = 1
718  VTAB 6 + ITEM
719  PRINT "ACCT #";ITEM;"-";
     TITLE$(ITEM);: HTAB 1: PRINT "ACCT
     #";ITEM;"-";: INPUT "";TEMP$
720  IF TEMP$= "DONE" THEN VTAB 6 +
     ITEM: CALL - 958:ITEM = ITEM - 1:
     GOTO 723
721  IF TEMP$ < > "" THEN TITLE$(ITEM)
     = TEMP$
722  VTAB 6 + ITEM: PRINT "ACCT
     #";ITEM;"-";TITLE$(ITEM): IF ITEM <
     20 THEN ITEM = ITEM + 1: GOTO 718
723  PRINT : INPUT "ALL CORRECT
     ?";TEMP$: IF TEMP$ = "" THEN 723
724  IF LEFT$ (TEMP$,1) < > "Y" THEN 715
725  HOME
730  VTAB 10: HTAB 13: FLASH : PRINT
     "PLEASE STAND BY": NORMAL
731  PRINT D$;"OPEN ";FILE$: PRINT
     D$;"WRITE ";FILE$: PRINT : PRINT :
     PRINT D$;"CLOSE"
740  PRINT D$;"OPEN ";FILE$
750  PRINT D$;"WRITE ";FILE$
760  PRINT ITEM
770  FOR I = 1 TO ITEM
780  PRINT TITLE$(I)
790  NEXT : PRINT D$;"CLOSE ": PRINT
     D$;"LOCK ";FILE$: GOTO 100
800  PRINT D$;"OPEN ";FILE$
810  PRINT D$;"READ ";FILE$
820  INPUT ITEM
830  FOR I = 1 TO ITEM
840  INPUT TITLE$(I)
850  NEXT
860  PRINT D$;"CLOSE ";FILE$
870  GOTO 100
1000 REM ******************************
1010 REM * ACCEPT ENTRY DETAIL
1020 REM ******************************
1030 HOME
1040 HTAB (9): PRINT "*** INVOICE
     ENTRY ***"
1050 VTAB (4): PRINT "INVCE# ------
     DATE --/--/--"
1060 VTAB (7): PRINT "CHECK
     AMOUNT --------"
1070 VTAB (10): PRINT "FROM:"
1080 VTAB (12): PRINT " --------------------"
1090 VTAB (16): PRINT "MEMO:"
1100 VTAB (18): PRINT"----------------------
     ----------------"
1195 OLD$ = CHECK$
1200 HTAB (7): VTAB (3): INPUT TEMP$
1210 IF LEN (TEMP$) < > 0 THEN 1250
1215 VTAB (3): HTAB (7): PRINT " ";OLD$;
1220 GOTO 1260
1250 CHECK$ = TEMP$
1260 VTAB (3): HTAB (7): PRINT " ";
1270 OLD$ = DTE$
1275 VTAB (3): HTAB (20): PRINT " ";OLD$;
1280 VTAB (3): HTAB (20): INPUT TEMP$
1285 IF LEN (TEMP$) < > 0 THEN 1300
1290 VTAB (3): HTAB (20): PRINT " ";OLD$;
1295 GOTO 1310
1300 DTE$ = TEMP$
1310 VTAB (3): HTAB (20): PRINT " ";
1320 OLD$ = AMOUNT$
1325 HTAB (13): VTAB (6): INPUT TEMP$
1330 IF LEN (TEMP$) < > 0 THEN 1350
1335 HTAB (13): VTAB (6): PRINT " ";OLD$;
1340 GOTO 1360
1350 AMOUNT$ = TEMP$
1360 HTAB (13): VTAB (6): PRINT " ";
1370 OLD$ = WHO$
1380 HTAB (1): VTAB (11): INPUT TEMP$
1385 IF LEN (TEMP$) < > 0 THEN 1400
1390 HTAB (1): VTAB (11): PRINT " ";OLD$;
1395 GOTO 1410
1400 WHO$ = TEMP$
1410 HTAB (1): VTAB (11): PRINT " ";
1500 OLD$ = C1$
1510 HTAB (1): VTAB (17): INPUT TEMP$
1520 IF LEN (TEMP$) < > 0 THEN 1550
1530 HTAB (1): VTAB (17): PRINT " ";OLD$;
1540 GOTO 1560
1550 C1$ = TEMP$
1560 REM
```

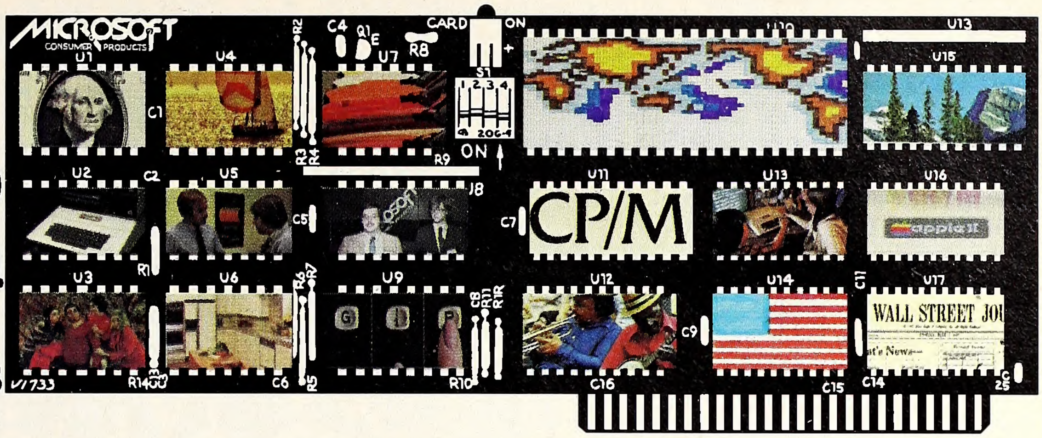
```
1610 HTAB (1): VTAB (19): PRINT " ";
1620 HTAB (1): VTAB (22): INPUT "IS THIS
     CORRECT (Y/N) ? ";TEMP$
1625 IF LEN (TEMP$) = 0 THEN 1620
1630 IF LEFT$(TEMP$,1) = "Y" THEN 2000
1640 HTAB (1): VTAB (22): CALL - 868:
     GOTO 1195
2000 REM ****************************
2010 REM * ASSIGN ACCOUNTS FOR
2020 REM * ENTRY AMOUNT
2030 REM ****************************
2040 HOME :CRT = 1
2045 FOR I = 1 TO ITEM:CUST(I) = 0: NEXT
2049 P = 0
2050 HTAB (9): PRINT "*** ASSIGN
     ACCOUNTS ***"
2053 DOLLAR = VAL (AMOUNT$)
2060 HTAB (1): VTAB (3): PRINT "AMOUNT
     REMAINING:";:DP = 25:V = DOLLAR:
     GOSUB 6000: PRINT
2065 PRINT "-----------------"
2105 GOTO 2210
2110 HTAB (1): VTAB (21): INPUT "SELECT
     ACCOUNT NUMBER ? ";TEMP$
2113 IF LEN (TEMP$) = 0 THEN 2110
2114 IF TEMP$ = "MENU" THEN 100
2115 ACCOUNT = VAL (TEMP$)
2120 IF ACCOUNT < 1 OR ACCOUNT >
     ITEM THEN 2110
2130 DOLLAR = DOLLAR +
     CUST(ACCOUNT)
2140 HTAB (22): VTAB (3): CALL - 868
2150 HTAB (1): VTAB (3): PRINT "AMOUNT
     REMAINING:";:DP = 25:V = DOLLAR:
     GOSUB 6000: PRINT
2160 HTAB (1): VTAB (22): INPUT
     "$AMOUNT$ TO ASSIGN ? ";TEMP$:
     IF LEN (TEMP$) = 0 THEN AMOUNT
     = DOLLAR + CUST(ACCOUNT):
     GOTO 2165
2163 AMOUNT = VAL (TEMP$) +
     CUST(ACCOUNT)
2165 IF ABS (DOLLAR - AMOUNT) < .001
     THEN 2180
2170 IF AMOUNT > DOLLAR THEN 2160
2180 DOLLAR = DOLLAR +
     CUST(ACCOUNT) - AMOUNT
2185 DOLLAR = INT (DOLLAR * 10 ^ 2 +
     .5) / INT (10 ^ 2 + .5)
2186 IF LEFT $ (TEMP$,1) < > "+" THEN
     2190
2187 DOLLAR = DOLLAR -
     CUST(ACCOUNT)
2188 CUST(ACCOUNT) = AMOUNT: GOTO
     2200
2190 CUST(ACCOUNT) = AMOUNT -
     CUST(ACCOUNT)
2200 HTAB (19): VTAB (3): CALL - 868
2205 REM
2207 HTAB (1): VTAB (3): PRINT "AMOUNT
     REMAINING:";:DP = 25:V = DOLLAR:
     GOSUB 6000: PRINT
2208 VTAB (4 + ACCOUNT):DP = 25:V =
     CUST(ACCOUNT): GOSUB 6000
2209 GOTO 2220
2210 REM
2211 VTAB 5:CRT = 1: FOR I = 1 TO ITEM:
     PRINT I;"-";TITLE$(I);
2212 X1 = LEN (TITLE$(I)) + 3: FOR X = 25
     TO X1 STEP - 1: PRINT ".";: NEXT X
2213 DP = 25:V = CUST(I): GOSUB 6000:
     PRINT : NEXT I
2220 IF DOLLAR = 0 THEN 2300
2240 GOTO 2110
2300 HTAB (1): VTAB (23): INPUT "IS THIS
     CORRECT (Y/N) ? ";TEMP$
2310 IF LEN (TEMP$) = 0 THEN 2300
2320 IF LEFT$ (TEMP$,1) = "Y" THEN 3000
2325 HTAB (1): VTAB 23: CALL - 868
2330 GOTO 2110
3000 REM ****************************
3010 REM * SAVE ENTRY TO DISK
3020 REM ****************************
3030 HOME
3040 HTAB 7: PRINT "*** SAVING FILE TO
     DISK ***"
3050 VTAB 10: HTAB 13: FLASH : PRINT
     "PLEASE STAND BY": NORMAL
3060 PRINT D$;"UNLOCK ";FILES$
3100 PRINT D$;"APPEND ";FILE$
3105 PRINT D$;"WRITE ";FILE$
3110 PRINT CHECK$
3120 PRINT DTE$
3130 PRINT AMOUNT$
3140 PRINT WHO$
3150 PRINT C1$
3160 PRINT C2$
3180 FOR I = 1 TO ITEM: PRINT CUST(I):
     NEXT I
3190 PRINT D$;"CLOSE ";FILE$: PRINT
     D$;"LOCK ";FILE$
3200 CHECK$ = "":AMOUNT$ = "":WHO$
     = "":C1$ = "":C2$ = ""
3210 GOTO 100
4000 REM ****************************
4010 REM * PRINT ENTRY FILE
4020 REM * FROM DISK
4030 REM ****************************
4040 HOME
4050 HTAB 7: PRINT "*** PRINT INVOICE
     FILE ***"
4055 VTAB 15: PRINT "INSERT PAPER AND
     PRESS RETURN": GET A$: PRINT
4060 REM
4065 SLOT = 1
4100 VTAB 12: FLASH : PRINT "PRINTING
     INVOICE FILE ";FILE$
4105 NORMAL
4110 PRINT D$;"PR#";SLOT: PRINT
4115 CRT = 0
4117 DTE$ = FILE$
```


BASIC TUTOR

```
4120 GOSUB 5000: REM HEADING
4130 PRINT D$;"OPEN ";FILE$
4140 PRINT D$;"POSITION ";
     FILE$;",R";ITEM + 1
4150 PRINT D$;"READ ";FILE$
4155 ENTRY = 1: FOR I = 1 TO
     ITEM:SUB(I) = 0:GN(I) = 0: NEXT
4160 ONERR GOTO 4500
4170 INPUT CHECK$
4180 INPUT DTE$
4185 INPUT AMOUNT$
4190 INPUT WHO$
4195 INPUT C1$
4200 INPUT C2$
4205 FOR I = 1 TO ITEM: INPUT CUST(I):
     NEXT
4210 PRINT "<#";CHECK$;">";
4230 V = VAL (AMOUNT$):DP = 28:
     GOSUB 6000
4340 FOR I = 1 TO ITEM
4350 V = CUST(I)
4360 DP = 30 + INT (I * 9)
4365 GOSUB 6000
4370 NEXT : PRINT
4375 PRINT " ";WHO$
4415 PRINT " ";C1$
4425 FOR I = 1 TO ITEM:SUB(I) = SUB(I) +
     CUST(I):GN(I) = GN(I) + CUST(I)
4430 NEXT
4435 ENTRY = ENTRY + 1
4440 IF ENTRY < 17 THEN 4170
4441 GOSUB 4443: GOSUB 5000: GOTO
     4170
4443 PRINT : FOR I = 1 TO 79: PRINT "=";:
     NEXT : PRINT
4444 PRINT "**** SUBTOTALS ****";
4445 AMT = 0: FOR I = 1 TO ITEM:AMT =
     AMT + SUB(I): NEXT
4446 DP = 28:V= AMT: GOSUB 6000
4448 ENTRY = 1: FOR I = 1 TO ITEM
4450 V = SUB(I)
4455 DP = 30 + INT (I * 8): GOSUB 6000
4460 NEXT : PRINT
4476 FOR I = 1 TO ITEM:SUB(I) = 0: NEXT
4480 RETURN
4500 POKE 216,0: GOSUB 4443
4510 GOSUB 7000
4525 AMT = 0: FOR I = 1 TO ITEM:AMT =
     AMT + GN(I): NEXT
4528 PRINT
4532 HOME
4533 FOR I = 1 TO ITEM
4535 PRINT TITLE$(I);
4540 DP = 20:V = GN(I): GOSUB 6000
4545 DP = 30:V = GN(I) * ROYAL(I) / 100:
     GOSUB 6000
4546 VTAB 1: POKE 36,40
4547 REM
4550 PRINT
4555 NEXT
4560 FOR I = 1 TO 40: PRINT "=";: NEXT :
     PRINT
4565 DP = 20:V = AMT: GOSUB 6000
4567 AA$ = P$:AMT = 0
4570 I = 1 TO ITEM:AMT = AMT + GN(I) *
     ROYAL(I) / 100: NEXT
4575 DP = 30:V = AMT: GOSUB 6000
4576 PRINT
4580 IF SLOT <> 0 THEN 4595
4582 HOME : VTAB 10: PRINT "TOTAL =
     $ ";
4583 PRINT AA$
4585 PRINT : INPUT "PRESS RETURN ";A$
4586 GOTO 4596
4595 PRINT CHR$ (12)
4596 :CRT = 1: PRINT D$;"PR#0": GOTO
     100
4999 REM **** HEADING ****
5000 PRINT CHR$ (12)
5005 PRINT "RECEIPTS FOR ";FILE$:
     PRINT
5010 FOR I = 1 TO ITEM
5011 K = INT ((10 - LEN (TITLE$(I))) / 2)
5012 IF K < 0 THEN K = 0
5020 VTAB 1: POKE 36,(K + 25 + INT
     (I * 10))
5030 PRINT TITLE$(I);
5040 NEXT : PRINT
5050 PRINT " INVOICE#
     -AMOUNT-"
5095 FOR I = 1 TO 79: PRINT "-";: NEXT :
     PRINT
5100 RETURN
6000 V = INT (V * 100 + .5) / INT (100 + .5)
6005 P$ = STR$ (V):P = 0: IF LEFT$ (P$,1)
     = "." THEN P$ = "0" + P$
6010 FOR J = 1 TO LEN (P$)
6015 IF MID$ (P$,J,1) = "." THEN P = J
6020 NEXT :J = J - 1
6030 IF NOT P THEN P$ = P$ + ".":P = J
6035 J = 2 - (J - P): IF NOT J THEN 6050
6040 P$ = P$ + LEFT$ ("00",J)
6050 DP = DP - ( LEN (P$) - 3): IF CRT
     THEN HTAB (DP): GOTO 6070
6060 VTAB 1: POKE 36,DP
6065 IF V = 0 THEN P$ = "----"
6070 PRINT P$;: RETURN
7000 PRINT CHR$ (12)
7010 FOR K = 1 TO 2000: NEXT
7020 PRINT"***** GRAND TOTALS FOR ";
     FILE$
7030 REM
7095 FOR I = 1 TO 79: PRINT "-";: NEXT :
     PRINT
7099 RETURN
9999 DATA 5
10000 DATA CASH SALES ,0
10020 DATA A/R SALES,0
10030 DATA SALES TAX,0
10035 DATA CITY SALES TAX,0
10040 DATA MISC.,0
```

SOFTCARD Symposium

by Greg Tibbetts



Welcome to the August installment of SoftCard Symposium and our continuing examination of the BIOS disk I/O arrangement. When we left off last month, we had begun examining the disk data structures and data collections. We covered a lot of ground in that column, discussing the format of information on the disk surface, the structure of the disk parameter block (DPB), and the CSV (*checksum vector*) and ALV (*allocation vector*) data collections. Our discussion was very involved; fortunately, we succeeded in covering the most complicated of the data structures. This month, therefore, we'll tackle the less complex ones: the directory buffer (DIRBUF), the sector translation table (XLT), and the root structure of the disk data elements—the disk parameter header (DPH). After that, we'll tie all of these items together so that we can better see their relationships to each other.

First, let's consider the directory buffer. This data collection is similar to the ALV and CSV data collections in that it is simply an area that BDOS uses to store disk information. This 128-byte buffer must be located in an area that's accessible to BDOS at all times and yet not subject to being overwritten by BIOS operations or user programs.

BDOS uses DIRBUF as its sole area for reading in the directory of the disk (one sector at a time). One would think that BDOS would use a single buffer (probably the default buffer at 80H) for the reading of all disk data, both file records and directory sectors, but, in fact, BDOS maintains two default buffers. The buffer at 80H is used for loading of file records, while DIRBUF is used for all directory operations.

Those of you familiar with BDOS system calls are probably now wondering why directory information is sometimes seen in the 80H buffer (an examination of 80H will often show such information when programs are being executed with DDT, for example). The reason is that during some system calls, BDOS must provide the user or his programs with directory information. BDOS itself does not use any buffer except DIRBUF for reading in this information, but it cannot allow the user to access DIRBUF and possibly alter its contents. Therefore, BDOS copies information out of DIRBUF into the user buffer during those system calls, thus ensuring that users get what they need and that the integrity of its own information is preserved.

BDOS uses DIRBUF for everything related to the directory. When a drive is logged in, BDOS loads each directory sector into DIRBUF to compute the checksums for the CSV table. As BDOS works with a file, it fills DIRBUF with the directory sector containing the entry for that file (or file extent). And as BDOS manipulates the file, reading from it or writing to it, it sometimes uses the image of the directory entry stored in DIRBUF as a source of information it needs—namely, the block number, extent number, and so on, as we discussed last month when we talked about directory entries. DIRBUF is also used to keep track temporarily of some of the changes that may be made to an entry (until BDOS gets the chance to write the altered entry out to disk).

Using DIRBUF in this fashion reduces the number of times BDOS must read from or write to the disk directory during file input and output. This represents a large improvement in performance, since reaccessing the directory would require BDOS to move the drive's read/write head to the directory track, read or write sectors, and then return the head to the track containing the current portion of the file being manipulated. The slowest part of disk operation is moving the read/write head from track to track, so anything that reduces the number of these head movements speeds things up considerably.

BDOS could take the approach of placing more information into DIRBUF (or use a larger DIRBUF), thereby reducing still further the number of directory accesses (mostly writes). But BDOS must update the directory from memory on a regular basis in order to preserve disk integrity; and the longer BDOS goes between directory writes as it alters information on the disk, the greater the user's opportunity to reset the computer, remove the disk, or take some other action that would leave the directory reflecting an inaccurate description of the disk's contents. (Obviously, DIRBUF need not be initialized to any particular value.)

The next data item we'll examine is the sector translation table (XLT). The initials XLT stand in this case for the word *translate*, with X representing the partial word *trans*, as is common in the electronics industry (recall Xmit for transmit, and so on). Although the XLT data structure is not officially used in SoftCard CP/M, we'll discuss it anyway, since it is widely used in generic CP/M and is an important concept.

In our first column on the BIOS disk I/O (June 1983), we drew a pie diagram with sixteen sections to show the relationship between logical

and physical sectors. We numbered the pie sections sequentially 0 to 15 around the outside of the circle. We numbered the pie sections inside as well, but that time we skipped two sections between each number; in other words, while the section numbered 0 on the inside was also numbered 0 on the outside, the section numbered 1 on the inside had the number 3 on the outside, the section with a 2 inside was numbered 6 outside, and so on. By skipping two sections each time, we went completely around the pie three full times before we finished the writing of the inside numbers.

Our result, then, was a pie diagram (see figure 1) containing sixteen wedge-shaped sections, each with a number inside and a number outside. This diagram represented the disk surface, with the numbers equivalent to the disk sectors. The outside numbers represented the physical sectors and the inside numbers the logical sectors. The term *physical* in this case referred to the fact that when the disk is formatted, those sector numbers are the ones written into the sector address field. Insofar as the controller is concerned, then, these are the only sector numbers that exist.

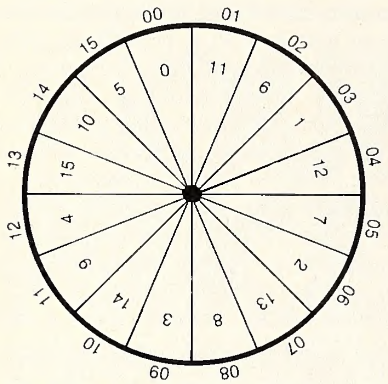


Figure 1. Pie diagram illustrating a disk surface with a two-sector software interleave arrangement. (Physical sector numbers are outside the circle, logical sector numbers are inside.)

One would think that physical sector numbers would be enough. However, for the system to use these physical numbers, it must be able to process data fast enough that when it has read one sector, it can process the data and return to read the next sector before the start of that sector has passed under the read/write head. Otherwise, an entire disk revolution will be lost between each sector read, resulting in the problem spoken of before, known as *blowing revs.*

A system that's not fast enough to prevent blowing revs must increase the space between sectors on the disk to avoid the problem. One way of increasing the space between sectors is by formatting with the physical sector numbers interleaved (that is, skipping sectors between each sector number). This is *physical sector interleaving* (also called *hardware interleaving*, since in many systems the disk controller completely controls what numbers get written into the address field of each sector).

Early disk controllers, however, weren't capable of formatting disks in any other fashion than with sector numbers in sequential order. The method that was arrived at is the one illustrated in the pie diagram we prepared. The disk's physical sectors (address-field numbers) are in sequential order on the disk, just as they were in the pie diagram. However, in writing data from memory to the disk, the operating system uses a different order—the logical sector numbers. As we discussed in June, this is called *software interleaving*, since it is the operating system (the software) that takes care of the interleave, letting the disk controller access the sectors in normal fashion (by their physical numbers).

In order to perform this software interleaving, the operating system needs some way of translating back and forth between the physical sector numbers required by the disk controller and the logical sector numbers requested by the user or calculated by the operating system from the directory data. It is the sector translation table (XLT) that enables the operating system to perform this function. To see how this works, look again at the pie diagram reproduced in figure 1. The diagram illustrates a two-sector interleave, since two physical sectors are skipped between each logical sector.

The XLT table for such an interleave would be created by simply listing the physical sector numbers in the order they would appear if we counted the logical numbers in sequence. See figure 2.

```
logical #  = 00,01,02,03,04,05,06,07,08,09,10,11,12,13,14,15
physical # = 00,03,06,09,12,15,02,05,08,11,14,01,04,07,10,13
```

Figure 2. XLT for two-sector interleave.

The XLT in this case would be the second list of numbers in figure 2, the list preceded by the word *physical.* We use the XLT by finding the sector number we want in the logical-sector list and then taking the number directly underneath it in the physical-sector list. The process we have just described, however, uses both lists, and we've already said that the XLT is just the physical-number list. Is there a way we can make the translation using just one list? Yes. To see how that's done, you must notice that each sector number in the logical list is equal to its offset value from the start of the list—that is, sector 01 is equal to the start of the list plus 1. It's possible, therefore, to use the logical sector number we are seeking as an offset value into the physical-sector list. For example, finding what physical sector contains logical sector 2 is a matter of looking at the entry in the physical list that is equal to the start of the list plus 2. That entry is the third item in the list (remember, you must count START+0 also) and is physical sector number 6. The number 6, then, is the physical-sector number we must give the disk controller in order to get back logical sector number 2. That's all there is to it.

So far we haven't spoken about SoftCard's method of interleaving. Since the technology on which the Apple Disk II system is based is largely unlike standard disk controller technology, the low-level read/write-track/sector (RWTS) routines actually form something resembling a "software disk controller." The operating system passes the command, track number, sector number, and other information to the RWTS routines and receives back a sector of data at an appointed place. Inside RWTS, there's an interleaving table in use, but this table is essentially transparent to the operating system and to anything else that may access RWTS. The interleave used here was designed to achieve maximum efficiency with access by RWTS, and given that, SoftCard's designers saw little to be gained by altering this system. SoftCard, therefore, treats the Apple RWTS routines (a part of Apple CP/M) simply as it would a disk-controller ROM.

As it turned out, however, CP/M was still not fast enough to process a sector of data and reaccess RWTS without blowing revs. Therefore, a separate table that takes RWTS's two-sector interleave and translates it into a three-sector interleave was designed for use with SoftCard.

This arrangement may seem unnecessarily complex. Why didn't SoftCard's designers create the inefficiency (that is, after all, what we're doing when we interleave) by altering the interleave table inside RWTS? That would have avoided having two interleave tables and the code that goes with them. Altering RWTS, however, would have two negative effects. First, as mentioned before, the interleave in RWTS is designed to maximize efficient access by RWTS. Making RWTS less efficient would solve the problem for CP/M, but what about the effect that that would have on utilities like COPY and FORMAT, which access RWTS directly? They don't need to be slowed down. An interleave table in CP/M handles the situation by putting the slowing-down factor where it is needed—within the operating system itself. Second, altering RWTS would destroy its ability to read standard Apple DOS format disks correctly. This is not a major problem, but leaving RWTS in its standard form means that utilities can be written that will read a DOS disk into memory with the sectors in a proper order, again by accessing RWTS directly.

With those two things in mind, it was decided to consider RWTS a black box as far as CP/M was concerned and to maintain its Apple compatibility. SoftCard, therefore, *does* perform software interleaving. Why, then, doesn't it have an XLT? The reason is that the Apple has to deal with only one disk format—its own. Because the operating system would never have to deal with disk drives other than Disk II, the interleaving could be built directly into the disk drivers and the entire XLT/SECTRAN combination could be eliminated. This may seem shortsighted in view of the number of hard-disk, eight-inch floppy, and other add-ons available, but it really presents no limitation, since all of these products require that the BIOS drivers be radically modified to communicate with standard disk controllers anyway. We'll examine this area further when we talk about the actual BIOS routines.

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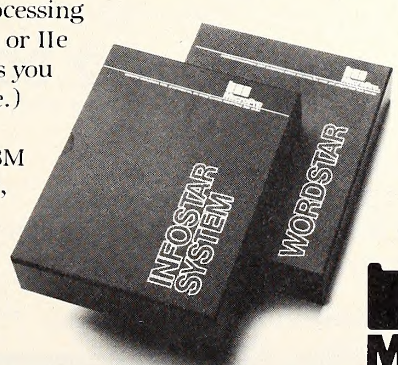

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This brings us to the final data structure we'll be discussing—the *disk parameter header*, or DPH. As we've said, the DPH is the root structure of the disk data elements. By knowing its location, BDOS (or any other program) can find all other data elements pertaining to the drive in question. Because it contains pointers to information that cannot be shared among drives, the DPH must be unique for each drive; in other words, each drive must have its own DPH.

Like the DPB, which we discussed last month, the DPH is made up of a number of data fields. A data field in this case is one or more contiguous bytes used for a specific purpose. The DPH has eight data fields, each of which is sixteen bits long. Obviously, then, the length of each DPH is sixteen bytes. Most of the data fields in the DPH are well documented by Digital Research, but three of them—DIRMAX, CURTRK, and CURREC— are used by BDOS for temporary storage and are for the most part undocumented and uncommented by DRI. The passage of time and the efforts of users have uncovered the uses and purposes of these three fields, and—to a limited extent, at least—we'll document them here. This information is of limited use, however, and affects our present discussion only minimally, so we won't go into great detail.

The DPH's sixteen bytes, then, are arranged as shown in figure 3.

	XLT	DIRMAX	CURTRK	CURREC	DIRBUF	DPB	CSV	ALV
	16b	16b	16b	16b	16b	16b	16b	16b
DPH	+0	+2	+4	+6	+8	+10	+12	+14

Figure 3. DPH data structure.

As can be seen from an examination of figure 3, knowing the starting location of the structure (shown as DPH) enables BDOS to find any field it needs by adding the field's offset value (shown as *+nn*) to the start address. To obtain the DPB address, for example, BDOS gets the DPH address from SELDSK (which we looked at briefly in June) and adds 10. BDOS can then simply load bytes number ten and eleven and it will have the DPB address. Now let's take a look at each of the fields.

Located at DPH+0, the XLT field contains one of two things—the address of the XLT table (described earlier) or, if no translation is necessary (either because the drive uses physical interleaving or because there is no interleaving), two bytes of zeros. A zero value in the XLT field informs BDOS that no translation is necessary. This tells BDOS that it can skip the usual call to SECTRAN and make the call to SETSEC with the logical sector number it wants. A certain degree of performance increase is realized by eliminating the call to SECTRAN, but it's so small by comparison with the actual disk access time that it's negligible for the most part. We'll postpone further discussion of sector translation until we talk about the actual BIOS disk subroutines.

The field at DPH+2, labeled in figure 3 as DIRMAX, is the first of the temporary locations used by BDOS. One of the first things BDOS does during drive select is to build a table of pointers inside itself, using selected fields of the DPH. DIRBUF, DPB, CSV, and other data fields have their contents copied directly from the DPH into this table. DIRMAX, along with the two fields that follow it, however, does *not* have its contents copied. Rather, the addresses of these fields are copied into the table instead; that is, the addresses DPH+2, DPH+4, and DPH+6 are copied by BDOS into its table. In this way, these three fields of the DPH are used as an actual data storage area, like the CSV or DIRBUF, rather than as a pointer to a data storage area.

DIRMAX (DRM), the first of these three temporary locations, contains a two-byte value that represents the number of valid (in use) directory entries for this disk. Remember we said last month that the DPB field DRM specifies the maximum number of directory entries the disk could hold. Remember also that we said BDOS reads these entries on a regular basis when searching the directory, compiling checksums, and so on. In an attempt to optimize this searching, BDOS adds up the valid directory entries and places this resulting value in the DIRMAX field. From then on, by updating this value during directory additions and deletions, BDOS always knows how many active entries are in this directory and can stop searching when it reaches that point. Given a disk format that allows a maximum of 1,024 directory entries but contains only twenty active entries, this has the effect of speeding up searches considerably.

CURTRK, at DPH+4, is the second of these temporary locations. It contains the current track address of the drive—that is, the current track the drive is positioned to. BDOS keeps track of this value during all file accesses and updates it constantly. This is the area that's used during calculations of track numbers from virtual record numbers before calls are issued to the BIOS SETTRK routine. Prior to each call to the BIOS HOME routine, the value at CURTRK is reset to zero.

The CURREC value, found at DPH+6, is similar to CURTRK; it is the current *virtual record number* for that drive. It is also used in calculating track numbers for BIOS SETTRK and in calculating virtual record numbers from the block numbers. Like CURTRK, CURREC is set to 00 prior to a BIOS HOME call and updated thereafter on a constant basis whenever BDOS seeks a different track or virtual record. BDOS assumes that none of the three temporary variables we've been discussing contains valid data initially, and, as a consequence, they need not be initialized to any specific value.

Next is the DIRBUF field at DPH+8, which contains the address of the 128-byte directory buffer we discussed earlier. All DPHs usually have the same address in the DIRBUF field, since there's nothing to be gained by having more than one such directory buffer.

The DPB field, located at DPH+10, contains the address of the DPB data structure for the drive. As we said last month, the DPB contains all specific information about the disk format in use in the drive, and BDOS uses the DPB to obtain information about that format. Drives with the same format require only one such DPB to describe them; consequently the DPHs of such drives will all show the same DPB address in this field.

The CSV field, located at DPH+12, contains the address of the *checksum vector* for this drive. As we saw last month, this data collection is the area BDOS uses to store checksum values for each directory sector contained on the disk. The checksum vector, therefore, gives BDOS something to check the directory of the current disk against to make sure the media has not been changed. Obviously, the checksum vector for each drive must, by definition, be different, so the CSV field of each drive's DPH will contain a separate address.

The final DPH field, ALV at DPH+14, is similar to CSV in that it

contains the address of a data collection. In this case the collection is the *allocation vector*. As we learned last month, this area is used by BDOS to keep track of the block numbers on the disk that are in use (allocated) and those that are free (unallocated). Like the checksum vector, the allocation vector must be different for each disk; therefore, the ALV field of each DPH will contain a different address as well.

The DPH is the only data structure that BDOS needs to be made directly aware of. As we've said, from this one table, BDOS can easily find any other information it needs concerning the drive in use. (Note that the DPH data structure is very much like the BIOS jump table that BDOS uses to find all the other various BIOS routines.)

Up to now we've been calling the DPH the *root structure* of the data elements. To see why, take a look at figure 4, which shows the interrelationship of the various structures. As this chart shows, the DPH literally points to all of the other data structures and collections that pertain to the specific drive associated with that particular DPH.

DPHs are ordinarily arranged in the BIOS in sequence. The DPH for drive A: usually comes first, followed by DPHs for all other system drives. In the case of SoftCard CP/M, the DPHs come immediately after the BIOS jump table at 0DA33H in 56K (AA33H in 44K).

There are six DPHs, corresponding to the six Apple drives allowed, extending to 0DA93H. Since DPHs contain important initial values, they cannot overlay other code when it is no longer needed. That's why they are in this location, where they'll be protected from damage.

As we said earlier, no XLT structures are included in the SoftCard BIOS, even though software interleaving is used. Because of this, the XLT fields of all DPHs are zeros. DIRBUF, the 128-btye directory buffer, is shared by all six drives; and consequently, the DIRBUF fields of all DPHs contain the same address, 0DEBAH in 56K. This area does overlay part of the cold-boot code, since DIRBUF need not be initialized to particular values and is not used until after the boot code is completed.

The ALV bit maps for the six drives (sixteen bytes for each drive) come next, starting at 0DF3AH for drive A:, 0DF4AH for B:, and so on. The ALV fields of the DPHs for drives A:, B:, and the rest contain these

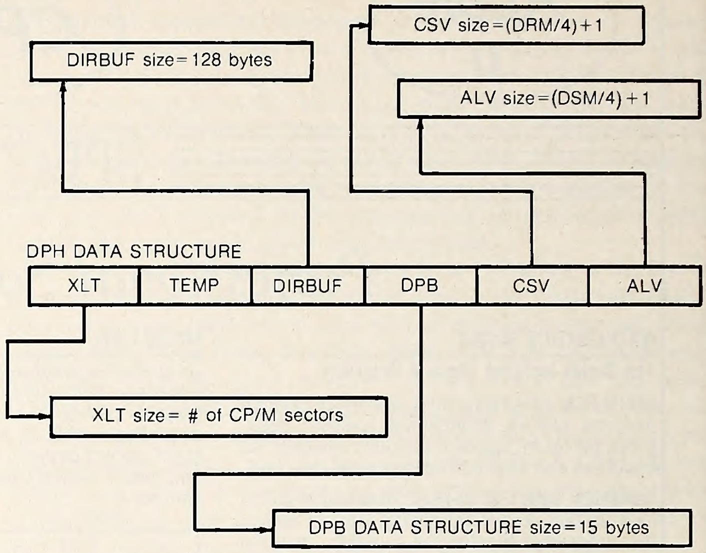

Figure 4. Relationship of disk data elements.

addresses. These fields too overlay the cold-boot code, since they needn't be initialized and are not used until after the boot sequence is over.

The CSV fields (twelve bytes for each drive) are next in memory, beginning at 0DF9AH for A:, 0DFA6H for B:, and so on. The CSV fields of the DPHs contain these addresses. Like the ALVs and DIRBUF, the CSV areas also overlay the cold-boot code, again to conserve space.

This completes our discussion of the DPH data structure, and of the data segment of the BIOS disk code as well. It is hoped that this very technical and in-depth discussion has shed light on a complex subject. With this behind us, we'll proceed next month to a discussion of the BIOS disk I/O routines themselves. Until next month. . . .

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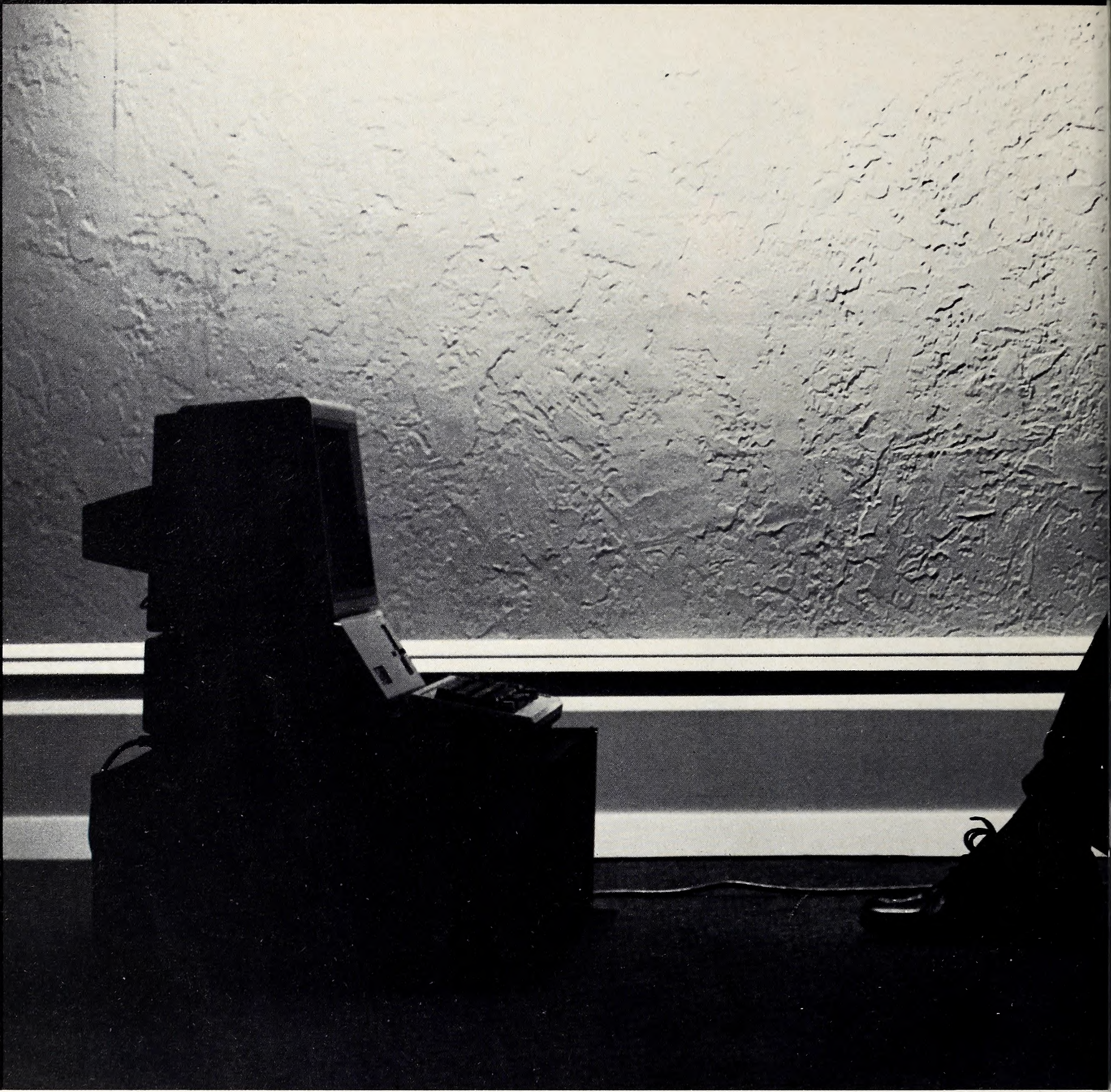

THE MIND-BLOWING

If you write Pascal programs for the Apple III, you probably know that, being a compiled language, Pascal is considerably faster than Business Basic, often by a factor of ten. Even Pascal, however, may not be fast enough in sorting large arrays of records. A sorting routine in assembly language should achieve the speeds necessary to sort unreasonable amounts of data in a reasonable period of time. The quicksort, invented by C. A. R. Hoare, is to date the most efficient sorting algorithm known for randomly arranged arrays, the duration of the sort being on the order of $N\log_2 N$, as opposed to the relative durations of the bubble sort, N^2, and the Shell Sort, $N^{1.2}$. Mixed with assembly language speed, the quicksort algorithm should approach the fastest sort possible on the Apple III.

The quicksort works by selecting a trial median and arranging the elements of the array into two partitions, one containing the elements that are greater than the median and the other containing those elements that are smaller. A trial median is then chosen for each of these partitions and the same operation is performed on each partition and so forth, until every subpartition has exactly one element. The array is then in order.

Since the same procedure is used over and over for each subparti-

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SORT by Thomas Lowe

tion, the algorithm lends itself to recursive programming, which is the technique used in this program. Each time a partition is divided into two subpartitions, the top and bottom indexes of each subpartition are pushed onto the 6502 stack and the routine executes a JSR to itself. When the indexes passed on the stack are equal, the partition then contains only one element, and the routine will consequently execute an RTS back to the calling routine, which, of course, is itself. Once the entire array is sorted, the RTS will return control to the Pascal host program.

Sorting techniques are discussed at length in the November 1982 issue of *Softalk* in The Third Basic; it's a good reference source for those wanting to delve deeper into the mysteries of sorting. Those wishing more information should read Professor Nicklaus Wirth's chapter on sorting techniques in *Data Structures + Algorithms = Programs*, Prentice-Hall, 1976. If you program in Pascal, you should own this useful book anyway.

Listing 1 is the assembly language external procedure Sort, which can be called by a Pascal program to sort either an *array of string* or an *array of record*, the first field of which is a string. In the latter case, the program will sort on the first field only. In order to make the listing more readable, the more complex routines are defined as macros, and the mac-

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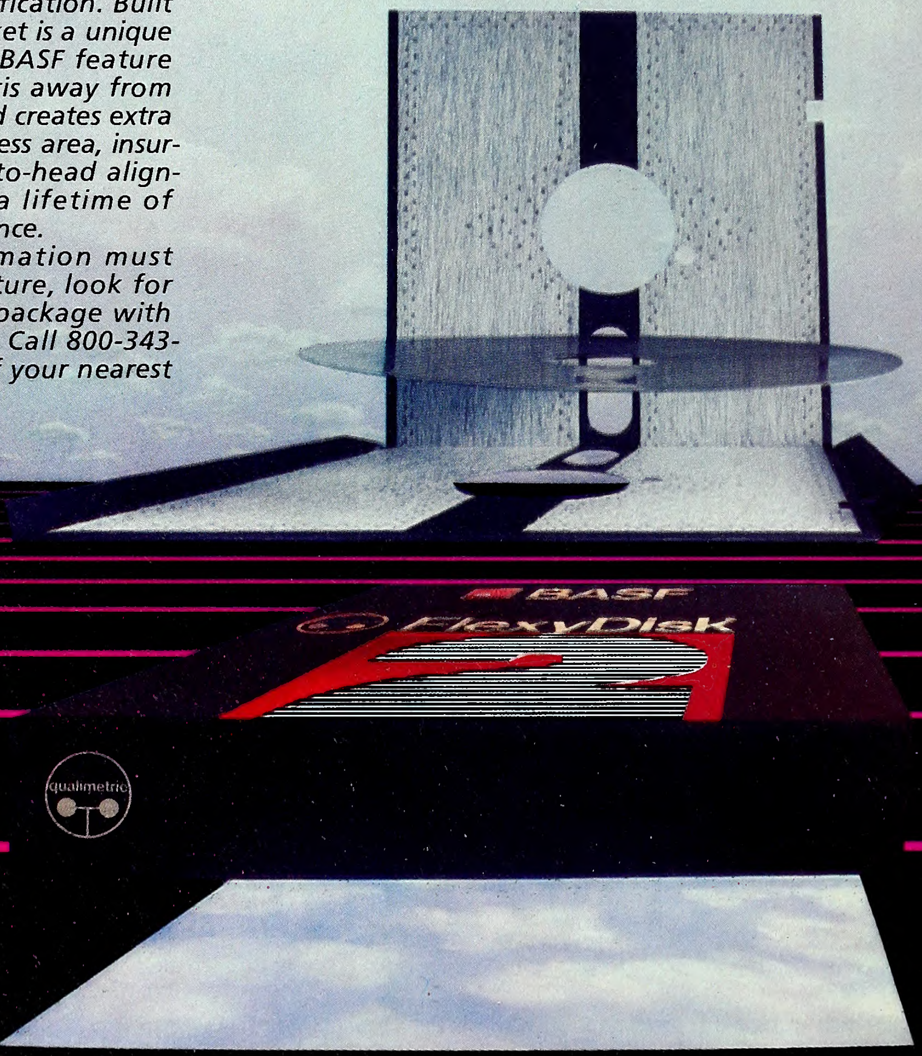

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ro definitions that are not obvious are provided with comments. Modifying the sort to operate on arrays of integers or reals would not be difficult for one familiar with 6502 assembly language.

To access the elements of the array without having to multiply each time, the program calculates a table of pointers, each of which points to the first byte of each element of the array to be sorted. The program then only has to multiply the array index by two and add the result to the base address of the array. This table is labeled "KEYS" and must be defined in the host program as KEYS:ARRAY[0..NUM] OF INTEGER, where NUM is the maximum number of elements in the array to be sorted. If you are not worried about conserving memory, you can define KEYS as a private variable of a given length and it will not be necessary to declare it in the host program. In such a case, KEYS must be $n+1$ words in length, where n is the number of elements in the array to be sorted. For more information about public and private variables, see *Apple III Pascal Program Preparation Tools*, pages 62 through 64.

The array to be sorted may have any legal name, but it must be declared as ARRAY[1..X] where X is less than or equal to NUM, and a single element of the array must not be longer than 255 bytes of memory. Each element of the array must be either a string or a record in which the first field declared is a string.

The procedure is called as follows:

SORT(SORT_ARRAY,NUMS,SIZE)

where SORT_ARRAY is the name of the array to be sorted, NUMS is the number of elements of SORT_ARRAY to be sorted, beginning with element [1] of the array, and SIZE is the length in bytes of an array element. SIZE may be obtained by use of the SIZEOF function.

Listing 1. Sort.

```
        .TITLE "QUICKSORT ASSEMBLY CODE"

        .PROC   SORT,3

;                       MACROS

        .MACRO  POP
        PLA
        STA     %1
        PLA
        STA     %1+1
        .ENDM

        .MACRO  PUSH
        LDA     %1+1
        PHA
        LDA     %1
        PHA
        .ENDM

        .MACRO  XWRD
        LDA     %1+1
        STA     %2+1
        LDA     %1
        STA     %2
        .ENDM

        .MACRO  ADDWRDS                 ;ADD %1 AND %2 --->%3
        CLC
        LDA     %1
        ADC     %2
        STA     %3
        LDA     %1+1
        ADC     %2+1
        STA     %3+1
        .ENDM

        .MACRO  PUTSTR                  ;INPUT IS SAMPLE,KEY#  PUTS SAMPLE AT KEY#
        XWRD    %2,HOLDING
        XWRD    KEYA,KEY
        ASL     HOLDING
        ROL     HOLDING+1
        LDA     KEY
        ADC     HOLDING
        STA     TEMP
        LDA     KEY+1
        ADC     HOLDING+1
        STA     TEMP+1
        LDY     #0
        LDA     @TEMP,Y
        STA     KEY
        INY
        LDA     @TEMP,Y
        STA     KEY+1
;AT THIS POINT KEY POINTS TO 1ST BYTE OF THE TARGET STRING
        LDY     #0
$01     LDA     %1,Y
        STA     @KEY,Y
        INY
        CPY     SIZE
        BNE     $01
        .ENDM

        .MACRO  GETSTR                  ;GETS A STRING FROM ARRAY [KEY]
        XWRD    KEYA,KEY                ;INPUT FORMAT: KEY#,STRING LABEL
        XWRD    %1,HOLDING
        ASL     HOLDING
        ROL     HOLDING+1
        LDA     KEY
        ADC     HOLDING
        STA     TEMP
        LDA     KEY+1
        ADC     HOLDING+1
        STA     TEMP+1
        LDY     #0
        LDA     @TEMP,Y
        STA     KEY
        INY
        LDA     @TEMP,Y
        STA     KEY+1
;AT THIS POINT KEY POINTS TO 1ST BYTE OF THE TARGET STRING
        LDY     #0
$03     LDA     @KEY,Y
        STA     %2,Y
        INY
        CPY     SIZE
        BNE     $03
        .ENDM

        .MACRO  CMPINT                  ;COMPARES TWO INTEGERS I1 AND I2
        SEC
        LDA     %1
        SBC     %2
        STA     CMPCON
        LDA     %1+1
        SBC     %2+1
        STA     CMPCON+1
        BNE     $10
        LDA     CMPCON
        BEQ     $10
        LDA     #1
$10     NOP
        .ENDM

        .MACRO  INC_WRD                 ;INCREMENTS AN INTEGER BY ONE
        CLC
        LDA     %1
        ADC     #1
        STA     %1
        LDA     %1+1
        ADC     #0
        STA     %1+1
        .ENDM

        .MACRO  DECWRD                  ;DECREMENTS AN INTEGER BY ONE
        SEC
        LDA     %1
        SBC     #01
        STA     %1
        LDA     %1+1
        SBC     #0
        STA     %1+1
        .ENDM

        .MACRO  CPSTR
;COMPARES A SAMPLE STRING WITH AN ARRAY ELT.
;INPUT FORMAT IS <SAMPLE,KEY>, WHERE SAMPLE POINTS TO THE 1ST BYTE OF THE
;SAMPLE STRING. THE RESULT IS POSITIVE IF SAMPLE>THE STRING INDEXED BY KEY
```

```
          XWRD     %2,HOLDING        ;SAVE THE KEY NUMBER
          XWRD     KEYA,KEY          ;GET THE KEY ARRAY STARTING ADDRESS
          ASL      HOLDING           ;MULTIPLY KEY NUMBER BY 2
          ROL      HOLDING+1
          LDA      KEY               ;LSB OF KEY ARRAY
          ADC      HOLDING           ;ADD TO LSB OF 2*KEY
          STA      TEMP              ;SAVE IN LSB OF "TEMP"
          LDA      KEY+1             ;MSB OF KEY ARRAY
          ADC      HOLDING+1         ;ADD TO MSB OF 2*KEY
          STA      TEMP+1            ;SAVE IN MSB OF "TEMP"
          LDY      #0                ;ZERO Y REGISTER
          LDA      @TEMP,Y           ;GET LSB OF ADDRESS OF ARRAY STRING
          STA      KEY               ;SAVE IN LSB OF "KEY"
          INY                        ;BUMP Y REGISTER BY ONE
          LDA      @TEMP,Y           ;GET MSB OF ADDRESS OF ARRAY STRING
          STA      KEY+1             ;SAVE IN MSB OF "KEY"

;AT THIS POINT KEY POINTS TO 1ST BYTE OF THE TARGET STRING WHICH CONTAINS
;THE LENGTH OF THE STRING

          LDA      %1                ;GET LENGTH OF SAMPLE STRING
          STA      ST1L              ;SAVE IN ST1L
          LDY      #0                ;ZERO Y REGISTER
          LDA      @KEY,Y            ;GET LENGTH OF ARRAY STRING
          STA      ST2L              ;SAVE IN ST2L
          LDY      #1                ;PUT 1 IN Y REGISTER. IT NOW INDEXES THE
                                     ;FIRST BYTE OF BOTH STRINGS
$04       LDA      %1,Y              ;GET THE FIRST BYTE OF THE SAMPLE STRING
          CMP      @KEY,Y            ;COMPARE WITH FIRST BYTE OF ARRAY STRING
          BNE      $06               ;IF NOT EQUAL WE ARE FINISHED
          CPY      ST1L              ;ARE WE AT END OF SAMPLE STRING?
          BEQ      $07               ;IF YES THEN GO COMPARE LENGTHS OF
                                        STRINGS
          CPY      ST2L              ;WHAT ABOUT THE ARRAY STRING LENGTH?
          BEQ      $07               ;IF YES THEN GO COMPARE LENGTHS OF
                                        STRINGS
          INY                        ;MORE COMPARISONS TO BE MADE—BUMP
                                        INDEX BY ONE
          JMP      $04               ;TRY AGAIN
$07       LDA      ST1L              ;GET LENGTH OF ARRAY STRING. IF THE
                                        STRINGS ARE EQUAL UP TO HERE.
          CMP      ST2L              ;THE LONGEST STRING IS TO BE CONSIDERED
                                        SMALLER
                                     ;THUS IF ST2L<ST1L THEN THE RESULT WILL
                                        BE " "
$06       NOP                        ;FINISHED
          ENDM


          .MACRO   GETADR            ;THIS MACRO TAKES A KEY NUMBER AND
;                                       RETURNS THE ADDRESS OF THE FIRST
;                                       BYTE OF THE STRING ARRAY ELEMENT. THE
;                                       FORMAT IS < KEY NUMBER LABEL.
                                        ADDRESS LABEL >
          XWRD     %1,HOLDING        ;SAVE THE KEY NUMBER
          XWRD     KEYA,KEY          ;GET THE KEY ARRAY STARTING ADDRESS
          ASL      HOLDING           ;MULTIPLY KEY NUMBER BY 2
          ROL      HOLDING+1
          LDA      KEY               ;LSB OF KEY ARRAY
          ADC      HOLDING           ;ADD TO LSB OF 2*KEY
          STA      TEMP              ;SAVE IN LSB OF "TEMP"
          LDA      KEY+1             ;MSB OF KEY ARRAY
          ADC      HOLDING+1         ;ADD TO MSB OF 2*KEY
          STA      TEMP+1            ;SAVE IN MSB OF "TEMP"
          LDY      #0                ;ZERO Y REGISTER
          LDA      @TEMP,Y           ;GET LSB OF ADDRESS OF ARRAY STRING
          STA      %2                ;SAVE IN LSB OF %2
          INY                        ;BUMP Y REGISTER BY ONE
          LDA      @TEMP,Y           ;GET MSB OF ADDRESS OF ARRAY STRING
          STA      %2+1              ;SAVE IN MSB OF %2
          .ENDM

          .MACRO   SWAPST            ;SWAPS RECORDS POINTED TO BY KEY1 AND
                                        KEY2
                                     ;INPUT FORMAT: < KEY1. KEY2 >
          GETADR   %1,SWAP1
          GETADR   %2,SWAP2
          LDY      #0
$100      LDA      @SWAP1,Y
          STA      SWAPA
          LDA      @SWAP2,Y
          STA      @SWAP1,Y
          LDA      SWAPA
          STA      @SWAP2,Y
          INY
          CPY      SIZE              ;SIZE MUST BE < 256. MAYBE WE'LL EXPAND
                                        LATER
          BNE      $100
          .ENDM

          .MACRO   AVERAGE           ;FINDS INTEGER AVERAGE OF TWO INTEGERS
                                     ;INPUT FORMAT IS <INTEGER1, INTEGER2>
          CLC
          LDA      %1
          ADC      %2
          STA      %3
          LDA      %1+1
          ADC      %2+1
          STA      %3+1
          ROR      %3+1
          ROR      %3
          .ENDM

          JMP      BEGIN             ;PUT THIS HERE TO GET THE RESERVED
                                     ;STORAGE BEFORE THE PROGRAM

;                         RESERVED STORAGE AND CONSTANTS

SWAP1     .EQU     0E8               ;USED BY THE SWAPST MACRO
SWAP2     .EQU     0EA               ;USED BY THE SWAPST MACRO
KEY       .EQU     0E6               ;WORK AREA
KEYA      .EQU     0E4               ;CONTAINS BASE ADDRESS OF KEY TABLE
TEMP      .EQU     0E2               ;WORK AREA
AR_ADR    .EQU     0E0               ;WORKING ADDRESS
RETURN    .WORD    0                 ;RETURN ADDRESS HOLDING WORD
NUM       .WORD    0                 ;NUM OF ELEMENTS TO BE SORTED
SIZE      .WORD    0                 ;SIZE OF EACH ARRAY ELEMENT
N         .WORD    0                 ;COUNTER
S_ARRAY   .WORD    0                 ;LOC OF ADDRESS OF ARRAY
          .PUBLIC           KEYS     ;WE USE DATA SPACE OF HOST
KEY1      .WORD    KEYS              ;ADDRESS OF KEYS ARRAY
TEMP1     .WORD                      ;WORKSPACE
SAMPLE    .BLOCK   128,0             ;SAMPLE MEDIAN LOCATION
SAMPLEA   .WORD    SAMPLE            ;ADDRESS OF SAMPLE MEDIAN
SA_ADR    .WORD    0                 ;ADDRESS OF SORT ARRAY
ONE       .WORD    1                 ;CONSTANTS DEFINED
TWO       .WORD    2
HIGH      .WORD    0
BOTTOM    .WORD    0
TOP       .WORD    0
LOW       .WORD    0
ST1L      .BYTE    0
ST2L      .BYTE    0
HOLDING   .WORD    0
CMPCON    .WORD    0                 ;USED BY CMPINT ROUTINE FOR COMPARISON
SWAPA     .WORD    0                 ;TEMP HOLDING ADR FOR SWAPST ROUTINE

;                  BEGINNING OF PROCEDURE SORT SETS UP THE KEY ARRAY
;                  WHICH POINTS TO THE SORT ARRAY. REFERENCES ARE ALWAYS
;                  MADE INDIRECTLY SO THAT THE ADDRESS OF AN ARRAY ELEMENT
;                  NEED NOT BE COMPUTED EACH TIME A REFERENCE IS MADE

BEGIN     POP      RETURN            ;GET RETURN ADDRESS
          POP      SIZE              ;GET ARRAY PARAMETERS
          POP      NUM
          POP      S_ARRAY
          PUSH     RETURN            ;PUSH RETURN ADDRESS BACK ON STACK
          CLD                        ;NO DECIMAL MODE
          XWRD     KEY1,KEYA
          XWRD     KEYA,KEY          ;SAVE IN KEY

          ADDWRDS  TWO,KEYA,KEYA     ;BUMP ADDRESS OF KEY ARRAY TO 2D ELT
          LDA      #0                ;ZERO ACCUMULATOR
          STA      N                 ;ZERO THE COUNTER
          STA      N+1
          XWRD     S_ARRAY,AR_ADR    ;INT AR_ADR WITH THE SORT ARRAY ADDRESS
$05       LDA      ARADR             ;GET LOW ORDER BYTE OF ARRAY ADDRESS
          LDY      #0                ;NO DISPLACEMENT
          STA      @KEYA,Y           ;PUT IN LSB OF TABLE ENTRY
          INY                        ;BUMP Y REGISTER
          LDA      AR_ADR+1          ;GET MSB OF ARRAY ADDRESS
          STA      @KEYA,Y           ;PUT IN MSB OF TABLE ENTRY
          INCWRD   N                 ;BUMP ENTRY COUNTER BY ONE
          ADDWRDS  TWO,KEYA,KEYA     ;BUMP KEY TABLE ADDRESS BY TWO
          ADDWRDS  AD_ADR,SIZE,AR_ADR ;BUMP ARRAY ADDRESS TO NEXT ENTRY
          CMPINT   N,NUM             ;FINISHED
          BNE      $05               ;IF NOT GO DO THE NEXT ONE
          XWRD     KEY1,KEYA         ;REINITIALIZE THE KEY POINTER
          XWRD     KEYA,KEY
          PUSH     ONE               ;BOTTOM OF ARRAY POINTER
          PUSH     NUM;              ;TOP OF ARRAY POINTER
          JSR      QSORT             ;GO SORT IT
          RTS

;ABOVE IS THE RTS TO THE HOST PROGRAM. BELOW IS THE QUICKSORT PROPER

QSORT     POP      RETURN            ;SAVE RETURN ADDRESS FROM STACK
          POP      HIGH              ;TOP OF ARRAY
          POP      LOW               ;BOTTOM OF ARRAY
          PUSH     RETURN            ;PUT RETURN ADR BACK ON STACK
          CMPINT   HIGH,LOW          ;SEE IF WE HAVE TO SORT
          BEQ      NOSORT            ;IF EQUAL WE DONT HAVE TO SORT
          BPL      GOSORT            ;IF HIGH>LOW WE HAVE TO SORT
NOSORT    RTS                        ;ELSE RETURN TO CALLING ROUTINE
GOSORT    AVERAGE  HIGH,LOW,SAMPLEA  ;FIND SAMPLE MEDIAN
          XWRD     HIGH,TOP          ;INIT TOP OF PARTITION
          XWRD     LOW,BOTTOM        ;INIT BOTTOM OF PARTITION
          GETSTR   SAMPLEA,SAMPLE    ;PUT TRIAL MEDIAN INTO "SAMPLE"
LOOP_Y    CPSTR    SAMPLE,TOP        ;IS TRIAL MEDIAN=>TOP ELEMENT?
          BPL      LOOP_Z            ;> GOTO LOOP_Z
          BEQ      LOOP_Z            ;= GOTO LOOP_Z
LOOP_X    DECWRD   TOP               ;INSTEAD DECREMENT TOP PARTITION POINTER
          JMP      LOOP_Y            ;TRY AGAIN
LOOP_Z    CPSTR    SAMPLE,BOTTOM     ;TRIAL MEDIAN<=BOTTOM ELEMENT?
          BMI      LOOP_O            ;< GOTO LOOP_O
          BEQ      LOOP_O            ;= GOTO LOOP_O
          INCWRD   BOTTOM            ;NO—INCREMENT BOTTOM POINTER
          JMP      LOOP_Z            ;TRY AGAIN
LOOP_O    CMPINT   TOP,BOTTOM        ;BOTTOM POINTER>TOP POINTER?
          BMI      JUMP_X            ;IF YES BRANCH TO JUMPING POINT
                                     ;DISPLACEMENT TOO BIG TO BRANCH
                                        DIRECTLY TO "ONWARD"
          JMP      SWP               ;NO—SO GO SWAP THE TWO STRINGS
JUMPX     JMP      ONWARD            ;KEEP GOING
SWP       SWAPST   BOTTOM,TOP        ;SWAP THE STRINGS
          INCWRD   BOTTOM            ;BUMP BOTTOM UP
          DECWRD   TOP               ;DECREMENT TOP
ONWARD    CMPINT   TOP,BOTTOM        ;IS THE TOP POINTER=>BOTTOM POINTER
          BPL      JUMP_Y            ;YES—GO BACK AND DO MORE
          BEQ      JUMP_Y            ;SAME
          JMP      CLEANUP           ;MORE MESS TO AVOID RANGE PROBLEMS
JUMP_Y    JMP      LOOP_Y            ;SAME
CLEANUP   PUSH     LOW               ;PUSH THE PARTITIONS ONTO THE STACK
          PUSH     TOP
          PUSH     BOTTOM
          PUSH     HIGH
          JSR      QSORT             ;SORT THE BOTTOM PARTITION
          JSR      QSORT             ;SORT THE TOP PARTITION
          RTS                        ;WHEN YOU GET HERE THE RECURSION
                                        IS FINISHED
```

Listing 2 is a Pascal program demonstrating the use of the Sort procedure. Note that Sort is declared as an external procedure. The array NAMES to be sorted consists of records, the first field of which is a string of length 8 and the second field an integer. Strings in Apple Pascal begin with a length byte followed by the string; integers are represented by two bytes. It is advisable to check the size of an element with SIZEOF because Apple Pascal does not always pack data compactly. For instance, integers are not stored across a word boundary; thus the following data type

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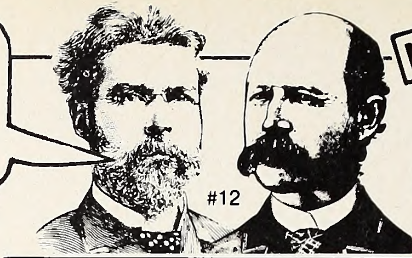

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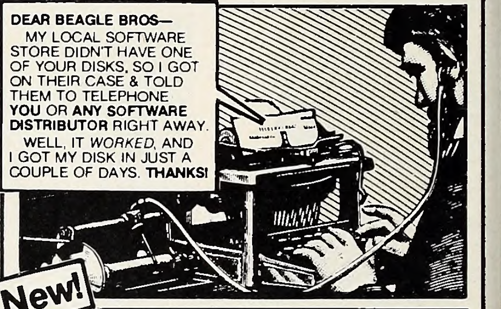

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```
TYPE SORTREC = RECORD
                    FIRSTFIELD:STRING[6];
                    SECONDFIELD:INTEGER
                    END;
```

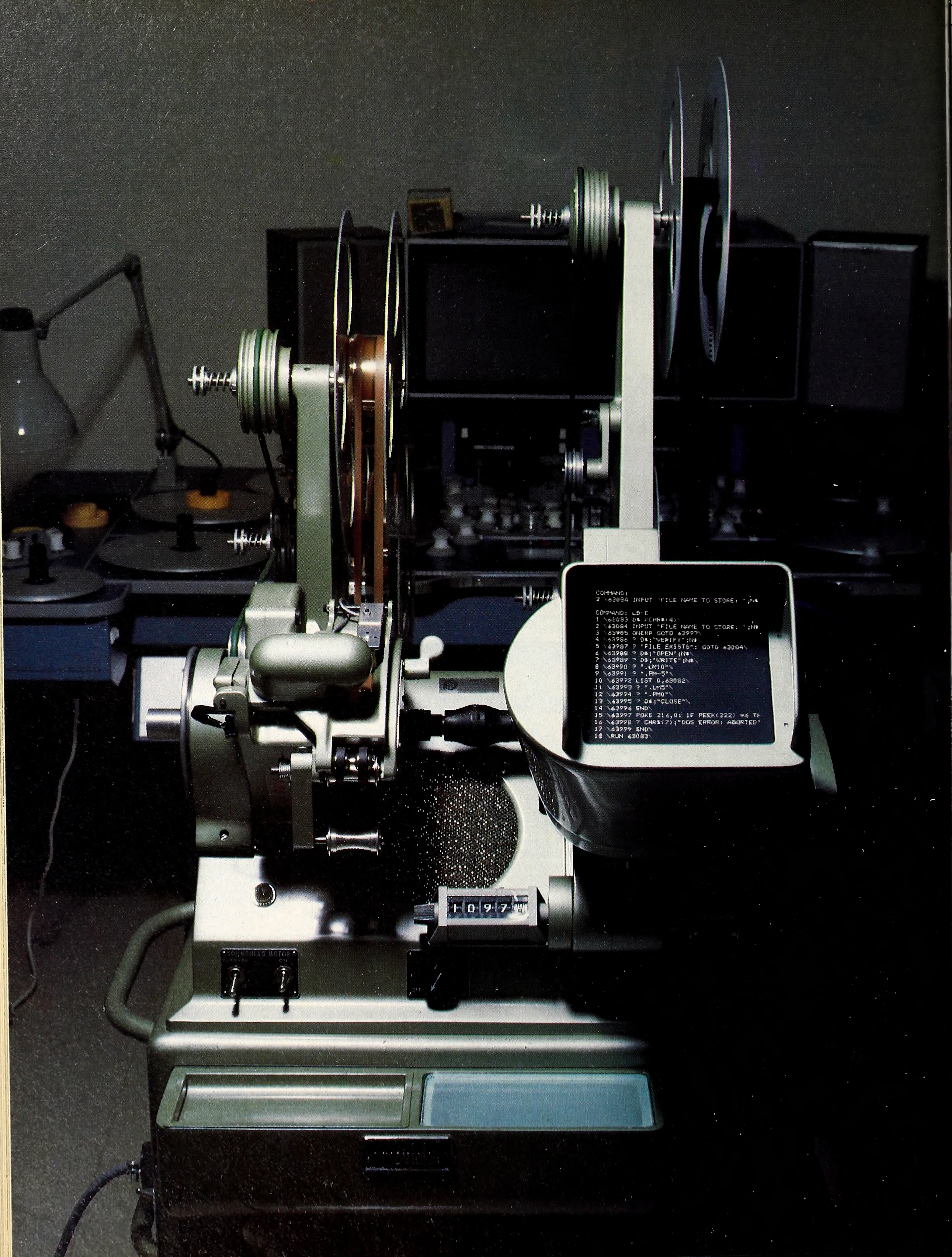
will have a length of ten bytes, not nine. The string will use seven bytes (one to store the length and six to hold the six characters of the string) and then the compiler will skip a byte to begin the integer on a word boundary. Thus SIZEOF(SORTREC) = 10.

Turning off the screen by sending it a CHR(14) as is done here will improve the performance of the sort by a factor of 40 percent. Sending it CHR(15) will turn it back on. If you do not have a working system clock, the elapsed-time information provided in the host program will be useless.

After you have assembled the sort routine and compiled the Pascal host program, invoke the linker and link the sort routine to the host. Of course, you may put Sort in a library if you wish. You will then see a breathtaking demonstration of what your Apple III can do when given the chance.

Listing 2. Demo using Sort.

```
PROGRAM QUICKSORT;

USES APPLESTUFF;

CONST   NUM=3000;
        STLN=8;

TYPE CAPS = 'A'..'Z';
     SORTREC=RECORD
               SSTRING:STRING[STLN];
               SNUM:INTEGER
               END;

VAR
    KEYS:ARRAY[0..NUM] OF INTEGER;
    NAMES:ARRAY [1..NUM] OF SORTREC;
    SR,X,Y,NUMS,WRDLENGTH:INTEGER;
    ST:STRING[STLN];
    STRG:STRING[4];
    CH:CHAR;
    ONECHRST:STRING;
    STARTING,FINISHING:STRING[6];

PROCEDURE SORT(VAR S_ARRAY;NUMBER,SIZE:INTEGER);EXTERNAL;

FUNCTION RND:CAPS;

        BEGIN
                        RND:=CHR(65+RANDOM MOD 26);
        END;

BEGIN   (*THE MAIN PROGRAM BEGINS HERE*)
    RANDOMIZE;
    SR:=SIZEOF(SORTREC);
    REPEAT
        WRITELN('ENTER NO OF WORDS YOU WISH TO SORT');
        WRITELN('ENTRY MUST NOT EXCEED ',NUM);
        WRITELN(' ');
        REPEAT
            READLN(NUMS);
            IF (NUMS>NUM) OR (NUMS<1) THEN BEGIN
              WRITE(CHR(7));
              WRITELN('NUMBER MUST BE>1 AND<=',NUM,' - TRY AGAIN')
              END;
            UNTIL (NUMS>0) AND (NUMS<=NUM);
        WRITELN(' ');
        WRITELN('GENERATING ',NUMS,' RANDOM ',STLN,'-CHARACTER ASCII WORDS ');
        ONECHRST:='X';
        FOR X:=1 TO NUMS DO BEGIN
            ST:='';
            WRDLENGTH:=1+RANDOM MOD STLN;
            FOR Y:=1 TO WRDLENGTH DO BEGIN
              ONECHRST[1]:=RND;
              ST:=CONCAT(ST,ONECHRST)
              END;

            NAMES[X].SSTRING:=ST;
            NAMES[X].SNUM:=X;
            WRITELN(NAMES[X].SNUM:4,'  ',NAMES[X].SSTRING)
            END;
        WRITELN(CHR(7));
        WRITELN(CHR(14));
        TIMEOFDAY(STARTING);

        SORT(NAMES,NUMS,SR);

        TIMEOFDAY(FINISHING);
        WRITELN(CHR(7),CHR(15));
        FOR X:=1 TO NUMS DO BEGIN
           WRITELN(NAMES[X].SNUM:4,'  ',NAMES[X].SSTRING)
           END;
        WRITELN;
        WRITELN('STARTED: ',STARTING);
        WRITELN('FINISHED: ',FINISHING);
        WRITELN('ANOTHER DEMONSTRATION? (Y/N) ');
        READ(CH);
        WRITELN
        UNTIL (CH='N') OR (CH='n')
END.
```


COMMAND:
2 \63084 INPUT "FILE NAME TO STORE: ";N$
COMMAND: LB-E
1 \63083 D$ =CHR$(4)\
2 \63084 INPUT "FILE NAME TO STORE: ";N$
3 \63985 ONERR GOTO 63997\
4 \63986 ? D$;"VERIFY";N$\
5 \63987 ? "FILE EXISTS": GOTO 63084\
6 \63988 ? D$;"OPEN";N$\
7 \63989 ? D$;"WRITE";N$\
8 \63990 ? ".LM10"\
9 \63991 ? ".PM-5"\
10 \63972 LIST 0,63082\
11 \63993 ? ".LM5"\
12 \63994 ? ".PM0"\
13 \63995 ? D$;"CLOSE"\
14 \63996 END\
15 \63997 POKE 216,0: IF PEEK(222) =6 TH
16 \63998 ? CHR$(7);"DOS ERROR: ABORTED"
17 \63999 END\
18 \RUN 63083\
1097

IIND GRADE CHATS

Apple II's Executive Editor

by Gary C. Kessler

The Apple II running under DOS can handle four types of files: Integer, Applesoft, binary, and text. Integer and Applesoft files can be created and edited with the Basic editors in ROM, and binary files can be changed by various methods, depending on how they were created. Modification of text files, however, is not so straightforward. Many word processors will do the job, but they're expensive. Besides, a line-based text editor is better suited than a word processor for some applications.

Edit, the program presented in this article, has been created to fill the need for an easy, inexpensive way to modify text files. It provides mechanisms to alter the contents of text files, including the ability to add, delete, change, and move lines.

Program Summary. The current version of *Edit* supports thirteen commands. The program is designed to allow other commands to be added, so *Edit* may be tailored to any user's application.

Edit begins by asking the user for the input file name. The input file is the file that the user wants to change or examine. If the input file name is null—that is, if you hit return without typing a name—*Edit* will create a new text file.

Next, the program asks for the output file name. The output file is where the edited text is stored. If the output file name is null, the edited text is stored in a file with the same name as the input file, and the input file is renamed with a .bak extension. Note that if both input and output file names are null, a new file is created and stored as Editdata.bak on drive 1.

Both of these requests will be accompanied by a drive number request if the computer thinks you have two disk drives. If you have only one drive and want to skip this input, change the value of DMAX% in line 180 to 1.

Text from the input file is then read in by the program. *Edit* can store up to 1,000 lines of text, although this limit may be easily altered. A file of 1,000 records should be sufficient for most applications. To alter this limit, change the dim of array LINE$ (line 100) and the value of LMAX% (line 160). *Edit* will not allow the input data to cause free memory to drop below 250 bytes. This limit may be changed by resetting the constant MMIN% (line 170).

After data is read in by the program, *Edit* goes into a command loop. The prompt "command:" indicates that the program is in this loop.

It is very important to understand the following four variables to follow the program flow. FIRST is a variable specifying the first line on which to begin the edit command; LAST specifies the last line. The variable CRNT specifies the current line pointer. Finally, K2% is a parameter for internally identifying the edit command. Each command has a unique positive value for K2%; these are listed in lines 18 through 48 of the program. If K2% is 0, then some sort of error has occurred in the command line.

Three special symbols may be used in place of any line number when you type in a command. A period signifies the current line (CRNT); a B indicates the beginning-of-file; and an E indicates the last line in the file (variable EOF%).

Commands are input and interpreted in the parser portion of the program (lines 20000 through 22300). The parser reads in a command character string, interprets the string's meaning, and sets the relevant variables to their appropriate values. It then checks to see if the first character of the command line is a legal command. If it is, K2% takes on the appropriate value; if there is an error, K2% is set to 0.

Some commands need to be followed by a line number. The parser checks these commands to evaluate the numbers, or special symbols, following the first character. This enables the program to set the variables FIRST and LAST appropriately.

Program Detail. This article on *Edit* is meant to provide a useful utility, as well as to act as a learning tool. This section provides a detailed description of what the code does. Although this program is written in Applesoft Basic for an Apple II computer, it could be easily transported to other machines. The only machine-dependent features are those dealing with file input and output.

Lines 2 through 50 of the code are identification and general comments.

```
2   REM   TEXT FILE EDITOR FOR APPLE II
14  :
16  REM   COMMAND SUMMARY:
18  REM   COMMAND      K2%      PURPOSE
20  REM   ------------ ------   ---------------------------
22  REM   Q            1        QUIT, NO SAVE
24  REM   X            2        EXIT & SAVE
26  REM   H  OR ?      3        HELP
28  REM   A            4        APPEND TO FILE END
30  :
32  REM   I(N)         10       INSERT BEFORE LINE N
33  REM   R(N)         11       REPLACE LINE N
34  REM   P(N)         12       SET CURSOR POINTER TO N
37  REM   S(N)"X"Y"    18       SUBSTITUTE "X" WITH "Y" ON
                                OR AFTER LINE N
38  REM   F(N)"S"      19       FIND "S" AFTER LINE N
40  :
41  REM   L(N)(-M)     20       LIST LINES N-M
42  REM   RETURN       20       LIST NEXT LINE
43  REM   -            20       LIST LAST LINE
44  REM   D(N)(-M)     21       DELETE LINES N-M
46  REM   C(N)(-M)     22       COPY LINES N-M TO CURSOR
                                POINTER
48  REM   M(N)(-M)     23       MOVE LINES N-M TO FOLLOW
                                CURSOR POINTER
50  :
```

Lines 100 through 190 specify certain program constants. Array CMD$ contains the command line; the length of command lines is specified by variable CMAX%. The array LINE$ contains the lines of the text file; the maximum number of records that the program stores is in

variable LMAX%. As data is input to the program, the amount of free memory is not allowed to fall below the value of variable MMIN%. The number of disks on the system is in variable DMAX%. Finally, the initial values of IN% and OUT% indicate that the input and output files are on drive 1.

```
100   DIM CMD$(50),LINE$(1000)
120   D$ = CHR$ (4):BS$ = CHR$ (8):CR$ = CHR$ (13)
140   Z$ = CHR$ (26):LB$ = CHR$ (91):BACK$ = CHR$ (92)
150   CMAX% = 50
160   LMAX% = 1000
170   MMIN% = 250
180   DMAX% = 2
190   IN% = 1:OUT% = 1
195   :
200   HOME : PRINT : PRINT
210   PRINT SPC( 13);"E D I T   V2.0": PRINT
220   PRINT SPC( 12);"TEXT FILE EDITOR": PRINT
```

Lines 240 through 290 deal with getting the name of the input text file, INFILE$. If a file name is given and there is more than one disk drive, the drive number, IN%, is also obtained. Lines 300 through 370 get the output file name, OUTFILE$. If no name is given, the output is sent to the input file. Otherwise, the output file disk drive number, OUT%, is determined. If no input file name is given and no output file name is given, the user is advised that output will go to a default file.

```
240   INPUT "ENTER NAME OF INPUT FILE: ";INFILE$
250   IF INFILE$ = "" GOTO 290
260   IF DMAX% = 1 GOTO 290
270   PRINT : PRINT "DRIVE # (1-";DMAX%;") ";: INPUT IN%
280   IF IN% < 1 OR IN% > DMAX% GOTO 270
290   PRINT
300   INPUT "ENTER NAME OF OUTPUT FILE: ";OUTFILE$
310   IF OUTFILE$ = "" THEN OUTFILE$ = INFILE$:OUT% = IN%:
      GOTO 360
320   IF DMAX% = 1 GOTO 360
330   PRINT : PRINT "DRIVE # (1-";DMAX%;") ";: INPUT OUT%
340   IF OUT% < 1 OR OUT% > DMAX% GOTO 330
360   IF OUTFILE$ = "" THEN PRINT : PRINT "OUTPUT IN FILE
      EDITDATA.BAK,D1": PRINT : PRINT " (HIT ANY KEY TO GO
      ON) ": GET DUM$:OUTFILE$ = "EDITDATA.BAK":OUT% = 1
370   EOF% = 0:XX = FRE (0)
380   IF INFILE$ = "" GOTO 800
```

If the input file is to be read in from disk, lines 440 through 480 will clear the screen and print an appropriate message. Lines 500 through 720 deal with the actual reading of the input. Each character is read from disk and concatenated into a line. The line ends when a carriage return (CR$) is encountered. The variable EOF% demarks the last record of the file. After every ten lines of input, free memory is purged by line 560, since the character-by-character input creates and discards a lot of strings. At the end of the file (line 700), the file is closed.

```
400   :
420   REM ENTER INPUT FILE
425   :
440   ONERR GOTO 700
460   HOME : PRINT : PRINT SPC( 11);
480   INVERSE : FLASH : PRINT "READING INPUT FILE":
      NORMAL
500   PRINT D$;"OPEN ";INFILE$;",D";IN%
520   PRINT D$;"READ ";INFILE$
560   IF INT (EOF% / 10) * 10 = EOF% THEN XX = FRE (0)
600   IF EOF% > = LMAX% OR XX < = MMIN% THEN PRINT
      D$;"CLOSE";INFILE$: PRINT "OUT OF MEMORY": GOTO
      59999
620   EOF% = EOF% + 1:LINE$(EOF%) = ""
640   GET DUM$
660   IF DUM$ <> CR$ THEN LINE$(EOF%) = LINE$(EOF%) +
      DUM$: GOTO 640
680   GOTO 560
700   PRINT D$;"CLOSE ";INFILE$
720   EOF% = EOF% - 1
740   PRINT XX
760   FIRST = EOF%:LAST = EOF%
```

Lines 800 through 920 comprise the command loop. The asterisk prompt is printed, then the command is input and interpreted by the subroutine at line 20000. The subroutine returns the variables K2%, FIRST, and LAST. K2% is the command number, FIRST is the first line on which this command is to act, and LAST is the final line this command will affect. If the value of any of these three variables is illegal, K2% is set to zero and an error message is printed.

The valid values of K2% are 1 through 4, 10 through 12, and 18 through 22. The K2% values are noncontiguous to allow easy addition of commands. K2% values 1 through 9 are reserved for commands with no arguments—those commands invoked by a single character only. Commands 10 through 19 are reserved for commands that will affect one line only. Commands 18 and 19 are used for commands dealing with strings. Finally, commands 20 through 29 are reserved for commands that will operate over a range of lines. These commands are entered as a command character, optionally followed by a line number, optionally followed by a dash and another line number.

```
780   :
790   REM COMMAND LOOP
795   :
800   HOME
820   PRINT : PRINT "COMMAND: "
830   POKE - 16368,0
840   GOSUB 20000
850   IF EOF% = 0 AND K2% < 10 GOTO 880
860   IF LAST > EOF% OR FIRST > EOF% OR FIRST < 1 OR LAST
      < FIRST THEN K2% = 0
880   IF K2% = 0 THEN PRINT " ## COMMAND ERROR. H OR ? FOR
      HELP. ##":FIRST = 1:LAST = EOF%: GOTO 820
900   ON K2% GOTO 1000,1400,2000,5100,820,820,820,820,820,
      5100,5500,5700,820,820,820,820,820,9000,9000,10000,10400,
      10700,10700
920   GOTO 820
990   :
```

Line 1000 starts the actual command implementation. Lines 1000 through 1100 deal with the quit command (K2%=1), making sure the user really wants to quit and then proceeding accordingly. The program insists on a Y or N response.

```
1000  REM QUIT
1010  :
1020  HOME
1040  PRINT "QUIT NOW & NOT SAVE CHANGES? (Y/N) ";: GET
      DUM$: PRINT DUM$
1060  IF DUM$ < > "Y" AND DUM$ < > "N" GOTO 1040
1080  IF DUM$ = "N" GOTO 820
1100  GOTO 59999
```

Lines 1400 through 1620 deal with the exit command (K2%=2). The program confirms that the user wants to exit. If this is the case, the program opens the output file, writes, and then closes the file.

```
1390  :
1400  REM EXIT
1410  :
1420  HOME
1440  PRINT "EXIT NOW & SAVE CHANGES? (Y/N) ";: GET DUM$:
      PRINT DUM$
1460  IF DUM$ < > "Y" AND DUM$ < > "N" GOTO 1440
1480  IF DUM$ = "N" GOTO 820
1482  XX = FRE (0): PRINT XX
1485  IF INFILE$ = OUTFILE$ THEN PRINT D$;"RENAME ";
      OUTFILE$;",";OUTFILE$ + ".BAK";",D";OUT%
1490  PRINT : PRINT SPC( 10);: INVERSE : FLASH : PRINT
      "WRITING OUTPUT FILE": NORMAL
1500  PRINT D$;"OPEN ";OUTFILE$;",D";OUT%
1520  PRINT D$;"WRITE ";OUTFILE$
1540  FOR I = 1 TO EOF%
1560  FOR J = 1 TO LEN (LINE$(I))
1580  PRINT MID$ (LINE$(I),J,1);
1590  NEXT J
1600  PRINT
1610  NEXT I
1620  PRINT D$;"CLOSE ";OUTFILE$
1640  GOTO 59999
```

Lines 2000 through 2040 implement the help command (K2%=3). This merely jumps to the subroutine at line 26000 that prints the help information.

```
1995  :
2000  REM HELP
2010  :
2020  GOSUB 26000
2040  GOTO 820
```

Lines 5100 through 5500 perform the append (K2%=4) and insert (K2%=10) commands. First, line 5110 checks to ensure that there is room in the file to add records. If there is no room available, the command is aborted. Otherwise, the line pointer CRNT is set to the value of FIRST. The new lines are entered here character by character. Special checks are made for the backspace, which is used as a delete key; return, which signifies the end of a line of input; and control-Z, which sends you back to command mode. All other control characters are filtered out of the input.

After a line is entered (that is, a CR$ is detected), the program has two choices. An append command adds lines to the end of file, in which case EOF% is incremented. An insert command causes all lines after the inserted line to be pushed back in the file.

```
5100  REM INSERT LINES PRIOR TO "FIRST"/APPEND TO END OF
      FILE
5110  IF EOF% > = LMAX% GOTO 5400
5120  CRNT = FIRST
5140  PRINT "ENTER NEW LINES (^Z TO END):": PRINT
5160  NW$ = ""
5180  GET DUM$
5190  IF DUM$ = Z$ GOTO 820
5195  IF DUM$ = CR$ THEN PRINT : GOTO 5230
5200  IF DUM$ < > BS$ GOTO 5220
5205  IF NW$ = "" THEN 5180
5206  IF LEN (NW$) = 1 THEN NW$ = "": GOTO 5215
5210  NW$ = LEFT$ (NW$, LEN (NW$) - 1)
5215  PRINT BS$;" ";BS$;: GOTO 5180
5220  IF ASC (DUM$) < 32 GOTO 5180
5225  PRINT DUM$;:NW$ = NW$ + DUM$: GOTO 5180
5230  IF K2% = 4 THEN CRNT = EOF% + 1: GOTO 5300
5240  FOR I = EOF% TO CRNT STEP - 1
5260  LINE$(I + 1) = LINE$(I)
5280  NEXT I
5300  LINE$(CRNT) = NW$
5320  EOF% = EOF% + 1
5330  IF K2% = 10 THEN CRNT = CRNT + 1
5340  IF INT (EOF% / 10) * 10 = EOF% THEN XX = FRE (0)
5360  IF EOF% < LMAX% AND XX > MMIN% GOTO 5160
5400  PRINT " ## FILE TOO FULL FOR INSERTIONS ##"
5420  GOTO 820
```

Lines 5500 through 5620 implement the replace command (K2%=11). First, CRNT is set to FIRST and the old line is printed out. The new line is input in the same way as it was in append and insert. A control-Z in this case will cause the new line to be ignored while preserving the old line.

```
5500  :
5505  REM REPLACE LINE "FIRST"
5510  :
5520  CRNT = FIRST
5540  NW$ = ""
5550  PRINT CRNT;" ";BACK$;LINE$(CRNT);BACK$
5560  PRINT "REPLACE LINE ";CRNT;" (^Z TO ABORT):": PRINT
5565  GET DUM$
5570  IF DUM$ = Z$ GOTO 820
5573  IF DUM$ = CR$ THEN PRINT : GOTO 5610
5575  IF DUM$ < > BS$ GOTO 5595
5578  IF NW$ = "" THEN 5565
5580  IF LEN (NW$) = 1 THEN NW$ = "": GOTO 5590
5585  NW$ = LEFT$ (NW$, LEN (NW$) -1)
5590  PRINT BS$;" ";BS$: GOTO 5565
5595  IF ASC (DUM$) < 32 THEN 5565
5600  PRINT DUM$;:NW$ = NW$ + DUM$: GOTO 5565
5610  LINE$(CRNT) = NW$:XX = FRE (0)
5620  GOTO 820
```

Lines 5700 through 5740 deal with the pointer command (K2%=12). It merely sets CRNT to FIRST and prints a message to the user.

```
5695  :
5700  REM SET CURSOR POINTER
5710  :
5720  CRNT = FIRST
5740  PRINT "POINTER (.) = ";CRNT
5760  GOTO 820
```

Lines 9000 through 9240 implement the substitute (K2%=18) and find (K2%=19) commands. These commands will search the range of lines FIRST to LAST for the string SRCH$ of length SLNG%. Note that it is not necessary for the program to search any line that is shorter than the search string. If the string is not found, a message to that effect is printed. If it is found, a message is printed and, in a substitution, SRCH$ is substituted on the line by the string SUBS$. This command then "flows" into the type command, after adjusting the values of FIRST and LAST.

```
9000  :
9005  REM FIND SEARCH STRING "SRCH" FOR FIND/SUBSTITUTE
9010  :
9015  IF SRCH$ = "" THEN PRINT "NO SEARCH STRING
      ENTERED": GOTO 820
9020  FOR I = FIRST TO LAST
9040  N = LEN (LINE$(I)) - SLNG% + 1
9060  IF N < 1 GOTO 9140
9080  FOR J = 1 TO N
9100  IF MID$ (LINE$(I),J,SLNG%) = SRCH$ GOTO 9200
9120  NEXT J
9140  NEXT I
9160  PRINT " ## SEARCH STRING NOT FOUND ##"
9180  GOTO 820
9200  PRINT " ## SEARCH STRING MATCHED AT LINE ";I
9220  FIRST = I:LAST = I
9240  :
9250  IF K2% < > 18 GOTO 10000
9260  DUM$ = ""
9270  IF J > 1 THEN DUM$ = DUM$ + LEFT$ (LINE$(I),J - 1)
9280  DUM$ = DUM$ + SUBS$
9290  IF LEN (LINE$(I)) > (J + SLNG% - 1) THEN DUM$ = DUM$ +
      RIGHT$ (LINE$(I), LEN (LINE$(I)) - (J + SLNG%) + 1)
9300  LINE$(I) = DUM$
9320  REM GOTO 10000
```

Lines 10000 through 10180 deal with the list command (K2%=20). CRNT is reset to LAST, then all lines from FIRST to LAST are displayed. Note that the backslash character (BACK$) is printed to delimit the beginning and end of the lines. After the printing of each line, line 10080 checks for a keypress. This allows you to halt the listing with the space bar. Then you can continue the list by hitting return or single step with the space bar. Hitting escape while the listing is paused puts you back in command mode, setting CRNT to the last line listed.

```
10000  :
10005  REM LIST LINES "FIRST" TO "LAST"
10010  :
10020  CRNT = LAST
10040  FOR I = FIRST TO LAST
10060  PRINT I;" ";BACK$;
10070  PRINT LINE$(I);BACK$
10080  IF PEEK ( - 16384) > 127 OR SS% = 1 THEN POKE
       -16368,0: IF PEEK ( - 16384) = 32 THEN GET A$
10090  IF A$ = CHR$ (32) THEN SS% = 1
10100  IF A$ = CHR$ (13) THEN SS% = 0
10110  IF A$ = CHR$ (27) THEN CRNT=I: I=LAST
10160  NEXT I
10170  SS% = 0:A$ = ""
10180  GOTO 820
```

Lines 10400 through 10540 deal with the delete command (K2%=21). First, line 10420 determines the number of lines to delete, N. Then, the lines from the end of the delete range (LAST) to EOF% are pushed toward the beginning of the file to delete lines FIRST to LAST. Finally, EOF% and CRNT are adjusted.

```
10395  :
10400  REM DELETE LINES "FIRST" TO "LAST"
10410  :
10420  N = LAST - FIRST + 1
10430  IF LAST + 1 > EOF% GOTO 10500
10440  FOR I = LAST + 1 TO EOF%
10460  LINE$(I - N) = LINE$(I)
10480  NEXT I
10500  EOF% = EOF% - N
10510  IF K2% = 21 THEN PRINT N;" LINE(S) DELETED"
10520  IF LAST < = EOF% THEN CRNT = LAST
10530  IF LAST > EOF% THEN CRNT = EOF%
10540  GOTO 820
```

Lines 10700 through 10960 implement the copy (K2%=22) and move (K2%=23) commands. The number of lines to be copied or moved is determined. If there isn't enough room, the command is ignored. Otherwise, records are pushed back to allow room for a copy of the new records. Then the records are copied to the new location. If this is a move command, the records are deleted from the original position in the file.

```
10695  :
10700  REM COPY/MOVE LINES "FIRST"-"LAST" TO CURSOR
       POSITION
10720  REM MOVE IS A COPY, FOLLOWED BY DELETE
10725  :
10740  N = LAST - FIRST + 1
10750  IF N > (LMAX% - EOF%) THEN PRINT " ## FILE TOO FULL
       FOR MOVE/COPY ##": GOTO 820
10760  FOR I = EOF% TO CRNT STEP - 1
10780  LINE$(I + N) = LINE$(I)
10790  NEXT I
10800  IF K2% = 22 THEN PRINT N;" LINE(S) COPIED"
10810  IF K2% = 23 THEN PRINT N;" LINE(S) MOVED"
10820  EOF% = EOF% + N
10830  IF CRNT > LAST THEN N = 0
10840  FOR I = FIRST TO LAST
10860  LINE$(CRNT) = LINE$(I + N)
10880  CRNT = CRNT + 1
10900  NEXT I
10920  IF K2% = 22 GOTO 820
10940  FIRST = FIRST + N:LAST = LAST + N
10960  GOTO 10400
```

Lines 20000 through 22300 comprise the command line parser, which obtains commands and determines if they are valid. The array CMD$ stores the command line, while CLNG% is the length of the command line. First, lines 20060 through 20150 input a command line. Then lines 20200 through 20420 check the first character on the line to ensure its validity. If the first character is a return, the next line number in the file or an [EOF] will be printed. If the first character is a minus sign, the program prints the prior line in the file or a [BOF] message if the pointer is at the beginning of the file.

Commands that make it to line 20560 are those requiring a line number—that is, most commands where K2% is greater than 9. If the line number is absent, a period, the symbol for the current line, is inserted in the command. The variable CP% is used to count which character in the command line we are looking at. The variable D% is the value of the number in the command line.

```
20000  REM COMMAND PARSE SUBROUTINE
20020  REM FIRST, GET CMD$ STRING
20040  :
20060  CLNG% = 1
20070  IF CLNG% < 1 THEN PRINT : POP : GOTO 820
20080  GET CMD$(CLNG%): PRINT CMD$(CLNG%);
20100  IF CMD$(CLNG%) = CR$ GOTO 20200
20120  IF CMD$(CLNG%) = BS$ THEN CLNG% = CLNG% - 1:
       GOTO 20070
20140  IF CLNG% < CMAX% THEN CLNG% = CLNG% + 1: GOTO
       20080
20150  CMD$(CLNG%) = CR$
20160  :
20180  REM DETERMINE IF FIRST CHARACTER IS A LEGAL
       COMMAND
20190  :
20200  K2% = 0
20220  IF CMD$(1) = "O" THEN K2% = 1: RETURN
20240  IF CMD$(1) = "X" THEN K2% = 2: RETURN
20260  IF CMD$(1) = "H" OR CMD$(1) = "?" THEN K2% = 3:
       RETURN
20262  IF CMD$(1) = "A" THEN K2% = 4: RETURN
20280  IF CMD$(1) = "I" THEN K2% = 10: GOTO 20560
20300  IF CMD$(1) = "R" THEN K2% = 11: GOTO 20560
20320  IF CMD$(1) = "P" THEN K2% = 12: GOTO 20560
20338  IF CMD$(1) = "S" THEN K2% = 18: GOTO 20560
20340  IF CMD$(1) = "F" THEN K2% = 19: GOTO 20560
20360  IF CMD$(1) = "L" THEN K2% = 20: GOTO 20560
20380  IF CMD$(1) = "D" THEN K2% = 21: GOTO 20560
20400  IF CMD$(1) = "C" THEN K2% = 22: GOTO 20560
20420  IF CMD$(1) = "M" THEN K2% = 23: GOTO 20560
20480  IF CMD$(1) < > CR$ GOTO 20500
20490  IF CRNT < EOF% THEN K2% = 20:FIRST = CRNT + 1:LAST
       = FIRST: RETURN
20495  PRINT LB$;"EOF]":K2% = 9: RETURN
20500  IF CMD$(1) < > "-" GOTO 20520
20510  IF CRNT > 1 THEN K2% = 20:FIRST = CRNT - 1:LAST =
       FIRST: RETURN
20515  PRINT LB$;"BOF]":K2% = 9
20520  RETURN
20530  :
20540  REM NOW DETERMINE FIRST LINE
20550  :
20560  IF CLNG% = 2 THEN CLNG% = 3:CMD$(2) = ".":CMD$(3) =
       CR$
20580  CP% = 2:D% = 0:FIRST = 0:LAST = 0
```

Lines 20600 through 20720 deal with determining the first line on which to act, namely FIRST. Note that the first character after the line number in the find and substitute commands is the string delimiter, DLM$.

```
20600  IF CMD$(CP%) > = "0" AND CMD$(CP%) < = "9" THEN D%
       = 10 * D% + VAL (CMD$(CP%)):CP% = CP% + 1: GOTO
       20600
20620  IF D% < > 0 THEN FIRST = D%:CP% = CP% - 1: GOTO
       21000
20640  IF CMD$(CP%) = "-" THEN FIRST = CRNT:CP% = CP% -
       1: GOTO 21000
20660  GOSUB 25000:FIRST = P2%
20680  IF FIRST < > 0 GOTO 21000
20700  IF CMD$(1) = "F" OR CMD$(1) = "S" THEN FIRST =
       CRNT:DLM$ = CMD$(CP%): GOTO 22060
20720  K2% = 0: RETURN
```

Lines 21000 through 21260 obtain the second line number. If K2% is less than or equal to 12, then only one line is used. LAST is set to FIRST, and the program performs the appropriate function. If K2% is 18 or 19, the program moves on to get the string to search for, SRCH$. For commands greater than 19, the second line number for the range, namely LAST, is retrieved. Note that for commands that operate over a range of lines, only one line number must be given if the desired range is only a single line. (For example, to type line 12, the commands T12 and T12-12 are both legal.)

```
20900  :
20920  REM HANDLE SECOND PARAMETER, IF ANY
20930  :
21000  IF K2% < = 12 THEN LAST = FIRST: RETURN
21020  IF K2% < 20 GOTO 22000
21040  CP% = CP% + 1
```

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```
21060  IF CMD$(CP%) = CR$ THEN LAST = FIRST: RETURN
21080  IF CMD$(CP%) < > "-" THEN K2% = 0: RETURN
21100  CP% = CP% + 1
21120  GOSUB 25000
21140  LAST = P2%
21160  IF LAST < > 0 THEN RETURN
21180  D% = 0
21200  IF CMD$(CP%) > = "0" AND CMD$(CP%) < = "9" THEN D%
       = 10 * D% + VAL (CMD$(CP%)):CP% = CP% + 1: GOTO
       21200
21220  LAST = D%
21240  IF D% = 0 THEN K2% = 0
21260  RETURN
```

Lines 22000 through 22300 deal with obtaining the strings used by the find and substitute commands. If only a single letter F or S has been given, we want to perform the appropriate command using the prior search and substitute strings. In the case of the find command, the search starts at the next line; in the case of substitute, the substitution search begins in the current line. This is because the search string may appear twice within the line, but the substitute command will only replace the first occurrence.

```
21900  :
21920  REM INPUT "SRCH" STRING FOR "FIND" OR
       "SUBSTITUTE"
21940  :
22000  CP% = CP% + 1
22020  IF CMD$(CP%) < > CR$ GOTO 22100
22030  FIRST = CRNT
22040  IF CRNT < EOF% AND K2% = 19 THEN FIRST = FIRST + 1
22050  LAST = EOF%
22060  RETURN
```

Lines 22100 through 22180 get the search string, SRCH$. First, the delimiter DLM$ is determined, then subroutine 24060 is called. The string returned is SRCH$. If this is a substitute command, a substitute string, SUBS$, must be obtained. If none is present, then an error message is printed. Otherwise, subroutine 24060 is called again, and the string that is returned is SUBS$. Note that the search string in the find command and the substitute string in the substitute command may be terminated by a carriage return; the string delimiter is not required at the end of the final string in these two commands.

```
22080  :
22100  DLM$ = CMD$(CP%)
22120  :
22140  GOSUB 24060
22160  SRCH$ = DUM$:SLNG% = LEN (SRCH$)
22180  IF K2% = 19 THEN LAST = EOF%: RETURN
22200  :
22220  IF CP% > = CLNG% THEN K2% = 0: PRINT "NO
       SUBSTITUTE STRING GIVEN": RETURN
22240  GOSUB 24060
22280  SUBS$ = DUM$:LAST = EOF%
22300  RETURN
```

The subroutine from lines 24000 through 24120 obtains the search and substitute strings. The routine checks the array CMD$ for all characters not matching the delimiter, DLM$. CP% counts the position in CMD$ and returns the string in DUM$.

```
24000  :
24020  REM GET SEARCH/SUBSTITUTE STRING
24040  :
24060  DUM$ = ""
24080  CP% = CP% + 1:X$ = CMD$(CP%)
24100  IF X$ < > CR$ AND X$ < > DLM$ THEN DUM$ = DUM$ +
       X$: GOTO 24080
24120  RETURN
```

The subroutine from lines 25000 through 25140 sets the variable P2% if the current character in CMD$ is a special symbol, namely B, E, or a period.

```
25000  :
25020  REM SUBROUTINE PARSE2. SET P2% TO CRNT IF CMD$ IS
       "."; TO 1 IF CMD$ IS "B";OR "EOF%" IF CMD$ IS "E"
25040  :
25060  P2% = 0
25080  IF CMD$(CP%) = "." THEN P2% = CRNT: RETURN
25100  IF CMD$(CP%) = "B" THEN P2% = 1: RETURN
25120  IF CMD$(CP%) = "E" THEN P2% = EOF%
25140  RETURN
```

The subroutine from lines 26000 through 26620 prints the help information.

```
25990  :
26000  REM HELP INFORMATION
26010  :
26020  PRINT : PRINT
26040  PRINT "EDIT COMMANDS:": PRINT
26060  PRINT "Q   QUIT, DO NOT SAVE CHANGES"
26080  PRINT "X   EXIT, SAVE CHANGES"
26100  PRINT "H   HELP"
26120  PRINT "?   HELP"
26125  PRINT "A   APPEND LINES TO END OF FILE"
26140  PRINT
26160  PRINT "I   INSERT LINES PRIOR TO N"
26180  PRINT "R   REPLACE LINE N"
26200  PRINT "P   SET CURSOR POINTER TO N"
26210  PRINT "S   SUBSTITUTE STRING AT OR AFTER LINE N"
26220  PRINT "F   FIND STRING AT OR AFTER LINE N"
26240  PRINT
26260  PRINT " FORM: C";LB$;"N] WHERE C IS F,I,P,R,S"
26280  PRINT " & N (OPTIONAL IN I,P,R) IS A LINE # OR SYMBOL."
26300  PRINT : PRINT "HIT ANY KEY TO CONTINUE";: GET DUM$
26320  PRINT : PRINT
26340  PRINT "L   LIST LINES N TO M"
26360  PRINT "D   DELETE LINES N TO M"
26380  PRINT "C   COPY LINES N-M TO PRECEDE CURSOR"
26400  PRINT "M   MOVE LINES N-M TO PRECEDE CURSOR"
26420  PRINT
26440  PRINT " FORM: C";LB$;"N]";LB$;"-M] WHERE C IS
       C,D,M,T"
26460  PRINT " & N (OPTIONAL) IS A LINE # OR SYMBOL."
26480  PRINT " & M (OPTIONAL) IS A LINE  # OR SYMBOL."
26500  PRINT : PRINT
26520  PRINT "SYMBOLS:"
26540  PRINT ".   CURRENT CURSOR POSITION"
26560  PRINT "B   BEGINNING OF FILE"
26580  PRINT "E   END OF FILE"
26600  PRINT : PRINT "HIT ANY KEY TO CONTINUE";: GET DUM$
26610  PRINT : PRINT
26620  RETURN
59999  HOME : END
```

Edit Commands. The following section briefly describes the *Edit* commands. A summary of these commands is listed at the end of this article. Each command line is terminated by hitting the return key. Four of the commands are initiated by typing one character. To stop an edit session and *not* save the changes to the output file, use the Q (quit) command. The user may wish to quit a session if a number of changes have been made to the file that are in error. To stop an edit session and save the changes to the output file, use the X (exit) command. Both quit and exit will verify that this is what the user really wants to do.

When in doubt as to what the commands are, type ? or H for help information. This will present a list of commands and options to the screen. Finally, to add new lines to the end of the file, use the A (append) command. The prompt "ENTER NEW LINES (^Z TO END):" will appear. Type in each new line, followed by hitting the return key. When you're done with the last new line (and the last return), hit a control-Z. (Control-Z is entered by hitting the Z key while holding down the control key. Note that the symbol ^Z is used in the program prompts to indicate control-Z.) Use the A command when initially creating a file or adding to the end of an existing file.

The following commands require the one-character mnemonic, optionally followed by one number. This number is the line on which the

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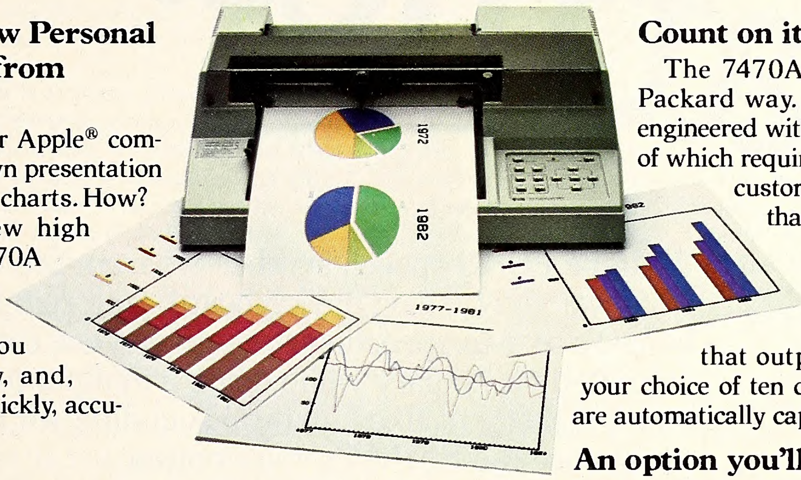

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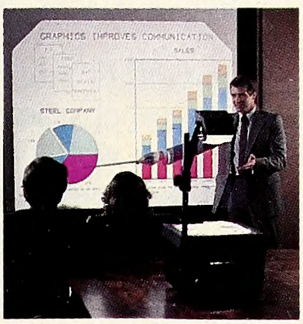

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edit command action will be performed. FIRST and LAST will take on this value, as will the variable CRNT. If no number is supplied, the command is performed on the current line.

To insert new lines prior to a given line, use the I (insert) command. Typing in lines in insert is the same as in append; after all lines are entered, hit a control-Z. For example, to insert lines prior to line 5, use the command I5. The first new line will be the new line 5. To insert prior to the current line, use I without a line number. Note that after you insert lines, the file line numbering will be changed.

To replace a line already in the text file, use the R (replace) command. The replace command will type the old version of the line and prompt you to enter a new line. At this point, merely type in the replacement for the old line. If you're in replace by mistake, or if you wish to keep the old line and ignore the new one, hit a control-Z any time prior to hitting return. For example, to replace the last line in the file, use RE; to replace line 28, use R28.

To set the current line pointer (CRNT) to a specific value, use the P (pointer) command. This is most useful in conjunction with moving and copying lines, which will be explained later. To set the current line pointer to line 12, type P12; to set it to the end of the file, type PE.

There are times when the user wants to search a text file for a particular character string. To do this, use the F (find) command. The form of the find command is F[*n*[*dsd*]] (where items in brackets are optional). The line number *n* is the first line on which to start the search. The character *d* can be any character not in the search string *s*, and acts as a string delimiter. Quotation marks make a good delimiter *if* there are none in the search string. The string *s* may run up to about forty-five characters. (The total length of a command line may not exceed fifty characters.) For example, to look for the string "TEXT" on or after line 12, enter the command F12$TEXT$; note that the $ was used as the delimiter, but any character besides a number or T, E, or X would have been all right. To find the string "APPLE" on or after the current line, use F.#APPLE#. The command F*n* will search for the most recently used search string on or after line *n*; the command F will look for the current search string on or after the current line. This is a good, easy way to continue a search. If the string search is successful, the line where the string was found will be printed, and FIRST and CRNT will be set to that line. If the search is unsuccessful, a message is printed and the variables FIRST and CRNT are not affected. Note that if a search string is specified, a line number *must* be used.

The command for string substitution is similar to find in structure and function. After finding a string, the user may want to substitute it with another string value. This is done by using the S (substitute) command, of the form S[*n*[*ds1ds2d*]]. The *d* represents a string delimiter, as in the find command listed previously. The S command will search for string *s1* starting at line *n* and will substitute string *s2* for *s1* at the first occurrence of *s1*. For example, the command S12!ORANGE!APPLE! will search for the string "ORANGE" on or after line 12 and will replace it with the string "APPLE." The S command will then continue the previous search/substitute operation at the next occurrence of the search string, while S18 will continue the search/substitution at line 18. Note that the line number *n* is required if search and substitute strings are specified. An error will occur if no search string is given. Upon successful substitution, the new line will be printed. If the substitution is not successful, a message to that effect will be printed.

The following commands require the one-character mnemonic, optionally followed by a number *n*, optionally followed by a dash and a number *m*. These commands operate on one line or over many lines. If *n* and *m* are not specified, the command acts on the current line only. If only *n* is specified, the command affects only line *n*, and variables FIRST and LAST will both take on this value. If *n* and *m* are both specified, action affects all lines *n* through *m*, FIRST takes on the value *n*, and LAST takes on the value of *m*.

To display a portion of the file to the screen, use the L (list) command. For example, to list line 12 of the file, use L12; to list lines 82 through 101, use L82-101; to list the entire file use LB-E or L1-E. Hitting a space during a listing halts it. While the listing is stopped, another space lists the next line, return continues the listing, or escape aborts it.

Hitting the return key in response to the command prompt will cause the next line in the file to be typed. The single-character dash will cause the previous line in the file to be typed.

To delete a portion of the file, use the D (delete) command. For example, to delete lines 42 through 44, use D42-44; to delete line 158, use D158. Note that after you delete lines from the file, line numbering will be altered.

To copy a portion of the file from one place to another, keeping the original lines where they are, use the C (copy) command. The copy command will copy a range of lines to just prior to the current line pointer. Thus, this is a two-step operation; first, set the current line pointer, then copy the lines. For example, to copy lines 8 through 12 to precede line 55, use the command P55 followed by C8-12. The M (move) command is similar to copy, except that move moves a portion of the file and deletes the original lines. Note that copy and move will affect the file line numbering.

Applications. A text-file editor can be used as an accessory or utility to aid you in using any of a number of different programs that use text files to store data. As currently written, *Edit* can't handle lower-case or control characters except on a IIe. If your specific application requires these functions, they could be added by modifying the input routines beginning at 5100 and 5500. How this would be done varies, depending on whether your Apple has lower-case display and input or must suffice with inverse characters, shift-key mods, and escape keys.

The primary use envisioned for *Edit* is the creation of what are often called exec files. These are text files that contain a series of commands. They are distinguished from programs in a couple of ways. They don't have line numbers, subroutines, or labels, so there is no way to jump from one section of the file to another. They are not held in memory all at once, so they can be quite long. But perhaps the most significant difference between an exec file and a program is that exec files are not limited to any one language. In fact, they can be used to issue commands to applications programs as easily as to DOS and Basic.

Commands within an exec file are carried out exactly as if you had typed them at the keyboard. So they can be used, for instance, to load a Basic program, modify it by adding or deleting lines, run it, and then answer all of its input requests. They're especially effective for creating self-running demos. The exec command is, in short, an extremely powerful feature of DOS 3.3., but one that is not frequently used because it isn't easy enough to line-edit text files. It is hoped that *Edit*, in addition to its other potential uses, will open this door for you.

K2%	Command	Meaning
1	Q	Quit edit, do *not* save changes.
2	X	Exit edit, save changes.
3	H or ?	Help.
4	A	Append lines to end-of-file.
10	I[*n*]	Insert prior to line *n*.
11	R[*n*]	Replace line *n*.
12	P[*n*]	Set current line pointer to *n*.
18	S[*n*[*dsdtd*]]	Substitute string *s* with *t*, separated by delimiter *d*, starting at line *n*.
19	F[*n*[*dsd*]]	Find *s* on or after line *n*. String delimiter represented by *d*.
20	L[*n*][−*m*]	List lines *n*−*m*.
	return	List next line.
	−	List previous line.
21	D[*n*][−*m*]	Delete lines *n*−*m*.
22	C[*n*][−*m*]	Copy lines *n*−*m* to before current.
23	M[*n*][−*m*]	Move lines *n*−*m* to before current.

Items in brackets ([ ]) are optional. (Don't try to type in the brackets.) If *n* is left out, current line is assumed, except in F and S commands.

Special symbols may be used as line numbers:

	Current line.
B	Beginning-of-file.
E	End-of-file.

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EVERYONE'S GUIDE TO ASSEMBLY LANGUAGE

BY JOCK ROOT

Part 2: Hello, Boss

This is supposed to be a column for beginners; the usual procedure is to give beginners a lot of background before letting them do anything. The problem with that approach is that, from the beginner's viewpoint, it's pretty boring.

On the other hand, the legend of the Sorcerer's Apprentice tells you what can happen if you go too fast with something you don't really understand.

We'll try to steer a middle course. From time to time we will simply tell you to do something, without explaining it; but we will try to be fair and balance the scales by explaining some things you already know.

Last month, we told you that the "brain" of the Apple, the microchip that tells the other chips what to do, is the microprocessor—sometimes called the cpu (for central processing unit) or the 6502 (that's the manufacturer's part number for the chip).

We also explained that assembly language for the Apple is simply the 6502 instruction set (the instructions the chip can execute), translated into human symbols. Thus, an assembly language program is essentially a list of instructions for the microprocessor.

Finally, we told you a little about memory, and somewhat less about input, output, and addressing.

It will take at least three or four such articles before you begin to *understand* assembly language programming; but you don't need to wait that long before *doing* it. We can give you a simple program, and a simple way of entering it into memory, in this article. By playing with that, you can start learning to use assembly language.

We'll want something *very* simple to start with, because there's more to assembly language programming than just writing the program. You also have to enter it into memory (unlike Basic, which does this for you automatically), and that means you have to know both how and where to enter it.

The program does something you probably know how to do in Basic: print a string. You can use this to insert a special message into a Basic program—a beep, a snide comment, a line of asterisks, or whatever—even though the message is not actually part of the Basic program and will not appear in its listing.

From Basic to Assembly Language. For the message in our example, we will use a respectful greeting from the machine to its master: "Hello, Boss!" Thus our program, written in Basic, would be

```
10  PRINT "HELLO, BOSS!"
```

The first thing we have to deal with, in translating this into assembly language, is that the microprocessor doesn't understand strings. It can take one character at a time and do something with it; but you (that is, your program) must tell it what to do each time.

However, that's not as bad as it sounds; the 6502 happens to be very good with loops, and you can put the print-the-next-character instructions in a loop. In Basic, that would give us

```
10  FOR X = 1 TO 12
20  READ A$: PRINT A$;
30  NEXT X
40  DATA H,E,L,L,O,",","  ",B,O,S,S,!
```

Note that the odd-looking quotes in line 40 are required by Basic in order to have the comma interpreted as data. This has nothing to do with assembly language.

However, there is one limitation of assembly language that we still have to deal with. The 6502 is good with loops but not quite as easy to use as Basic. There is more housekeeping to do. Our Basic model of the assembly language program should look more like this:

```
10  X = 0
20  READ A$: PRINT A$;
30  X = X+1
40  IF X < 12 THEN 20
50  DATA H,E,L,L,O,",","  ",B,O,S,S,!
```

Assembly Language Mnemonics. A *mnemonic* is a trick for remembering something. In this case, it means a mnemonic name, or label: a three-letter code word that stands for a longer word or phrase. LDA, for example, is the mnemonic for load accumulator; a couple of others, for comparison, are LDX for load X register and STA for store accumulator.

The accumulator (as mentioned in last month's column) is the main working area of the microprocessor. The 6502 operates on one byte at a time (a byte is a unit of information; for now, think of it as one character of the message), and the place where it works on that byte is the accumulator.

Before you can work on a byte, you must load it into the accumulator: LDA. When you're through with the byte, you usually want to store it somewhere: STA.

Actually, that's not the whole story. The accumulator is the main working area, but not the only one. There are two other working areas, the X and Y registers. You can load a byte into these registers, modify it, then store it someplace else, as you can with the accumulator. These registers cannot do all the tricks the accumulator can; but there is one thing they do really well, and that thing is counting.

We are going to need some counting in our program: Something is going to have to count the number of passes through the loop and stop the program when the count reaches 12. In Basic, we used the variable X; in assembly language, we will use the X register.

Take a look at the Basic version and the assembly language listing of the program, shown at the end of this article. The first line in the Basic program says, in effect, "Preset the loop-counting variable to zero." In assembly language you say the same thing, except for one word: "Preset the loop-counting *register* to zero." In other words, load a zero into the X register. LDX 0 at line 15 is the first instruction in our assembly language program.

Line 20 in the Basic version actually consists of two statements: read A$ and print A$. You can't do that in assembly language; each statement must be a separate instruction to the microprocessor. And that's not all: Each of these tasks turns out to be considerably more complex in assembly language than in Basic.

Assembly Language Statements. You see, the mnemonics described above are not complete statements. They represent only the first half of an instruction to the microprocessor. A mnemonic is the name of an operation, something to be done (in fact, another word for mnemonic is *operator*). You have to tell the processor not only what to do, but what to do it *to*. You have to specify both an operation and an object for that operation: in technical terms, both an operator and an *operand*.

For example, in our first instruction, LDX 0, the operator is LDX (what to do: Load the X register) and the operand is 0 (what to load it with: zero).

This is a simple form (which is why we used it for the first line of our program), but it is not the usual form. In LDX 0, the operand is a number, which is to be used immediately; it will be loaded into the X register just as it is. The operand itself is the subject of the operation—and that is unusual.

In its more usual form, the operand is an *address*, specifying a place in memory where the number we really want is stored. In this form, the subject of the operation is the byte stored in the *location* specified by the operand.

Thus, an assembly language instruction usually consists of a mnemonic and an address; except that in *immediate mode addressing*, as in our LDX 0, the "address" is not really an address at all, but instead is the byte we want—right there, immediately.

Immediate mode addressing requires a special format; LDX 0 is actually wrong. That would get us the value that is currently stored in memory location number zero. What we have to say is LDX #0—which will load the byte that immediately follows the # symbol into the X register.

Addresses. This is a hairy topic and we aren't going to go deeply into it today. One of these months we'll do a whole column on it; but for now, if you want more details, see the article "The Handy & Hook" in last month's issue.

We are talking, of course, about addresses in memory—RAM, or read/write memory, to be specific. This part of memory is the Apple's notebook for the job it's doing at the moment, and more—blackboard, notebook, file cabinet, and library would about cover it. Read/write memory is a busy and important place.

It's also big. On a 48K Apple, there are more than forty-eight thousand memory locations, each of which can store one byte (that is, one character of a string, one digit of a number, and so on).

As you can see, we'll need a good way to keep track of where we put things in this memory area.

You can think of memory as a giant array of mailboxes, each of which can hold exactly one byte of information and each of which has its own unique address. You can read the byte that's in a particular mailbox with LDA and the address of that mailbox. This will copy the addressed byte into the accumulator. Or you can copy a byte from the accumulator into a mailbox—that is, store it in that mailbox—with STA and the mailbox's address.

That explanation leaves a lot out. For one thing, the addresses usually have to be in the hexadecimal number system, which is another topic in itself. Nevertheless, let's leave it at that for now. One address can store one byte, and that byte can be read or written over (note that if you write to a mailbox you destroy whatever was there before).

If you're still puzzled, here's another way to look at it. Each memory address represents a variable, like the variables in Basic, except that these variables can hold only certain kinds of values (like integer variables, only more so). One byte of memory—one mailbox—can hold a single character or a small number; if you want to put more than that in your variable, use a string of mailboxes, side by side. That's how we're going to store the message "Hello Boss!" for example.

Indexed Addressing. Now that you've mastered the immediate mode of addressing (in which the operand itself is the desired byte) and the simple mode (in which the operand is the *address* of the desired byte, technically known as the *absolute* mode), it's time to deal with something a bit tricky: *indexed* addressing.

The X and Y registers are designed to be used as *index* registers—that's why they're so good at counting. Indexing your way through a list means pointing out each item in the list, one after another (as you might do with your *index* finger), and that's what these registers are for.

The hardware of the 6502—the silicon switching circuits inside the chip—can add the contents of one of these registers to an address before it uses the address. This is called indexed addressing.

Here's how it works. We're using the X register as a loop counter, so it has a different value on each pass through the loop. If we use those same values to index the address of an LDA instruction, we can read from a different memory location on each pass through the loop.

And that is how we're going to load the message, "Hello, Boss!" The assembly language instruction, line 16, is LDA MSG,X, in which MSG

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is a label for the address at which the first character of the message is stored.

The next line of our program is a short-cut: JSR COUT. COUT is an Apple Monitor routine that outputs the character in the accumulator to the currently active output device, thus saving us the trouble. We simply call this routine on each pass through the loop after we've read the desired character into the accumulator. JSR is assembly language for gosub—we'll have more on that another day.

Next, the X-register-as-counter does another trick for us. INX is the mnemonic for increment X, meaning add one to the X register. This is a complete instruction, one of the reasons X is so good at counting (there is also a DEX instruction, for counting backward; and the Y register has a similar pair). Note that these are among the few instructions that do *not* require an operand.

Finally, line 19 compares the current value of X to 12 (remember, the # means that 12 is the desired value, not the address of the desired value), and line 20 repeats the loop if X is not big enough yet. BCC is short for branch if carry is clear, and that's another thing we'll have to explain some other time.

Line 21 sends you back to the calling program—RTS is assembly language for return.

Then there's a BRK statement at line 22. The Apple will never see this as part of the program, because of the RTS just ahead of it; so we can use it as a reference point to separate program from message. It will show up as a zero byte in the machine code, so we can find it easily.

And finally we have the message. It's in high-bit ASCII—Apple ASCII codes, but with the high bit set. If that sounds like gibberish, take the normal (decimal) ASCII value of a character and add 128 to it.

User Notes. So how do you use it? Well, first you have to enter it. The numbers on the right side of the listing are in decimal—these are the ones you want. You have to poke them into successive locations in memory, starting at 768 as indicated in line 12. The ORG mnemonic in that line is a command to the assembler—not the microprocessor—to start the program at the specified location. It is short for origin. The numbers beneath 768 (the ORG address) on the right-hand side are the decimal equivalents of the hex numbers on the far left. These decimal numbers are the ones to poke in, one number to each location. So, in Basic: poke 768,162: poke 769,0: poke 770,189, and so on.

After that, type *call 768* and the Apple will greet you with "Hello, Boss!" It works equally well from within a program: The hello program on one of your disks, for example.

```
                  1  *********************
                  2  *                   *
                  3  *                   *
                  4  *                   *
                  5  * HELLO, BOSS       *
                  6  *                   *
                  7  *                   *    (DECIMAL)
                  8  *********************    -------------
                  9
                 10  COUT   EQU   $FDED    65005 or -531
                 11
                 12         ORG   $300       768
                 13
                 14
0300: A2 00      15         LDX   #0         162   0
0302: BD 0F 03   16  LOOP   LDA   MSG,X      189  14    3
0305: 20 ED FD   17         JSR   COUT        32 237  253
0308: E8         18         INX              232
0309: E0 0C      19         CPX   #12        224  12
030B: 90 F5      20         BCC   LOOP       144 245
030D: 60         21         RTS               96
030E: 00         22         BRK                0
                 23
                 24
                 25  MSG    ASC   "HELLO, BOSS!"
030F: C8 C5 CC                               200 197  204
0312: CC CF AC                               204 207  172
0315: A0 C2 CF                               160 194  207
0318: D3 D3 A1                               211 211  161
```

When the program is in memory and working, you can save it on disk with *bsave Hello Boss, A768, L27.*

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Taylor Pohlman

Exploring Business Basic, Part 23

Last month we undertook a challenge to use the flexibility of the soft (programmable) character set of the Apple III to do something usually reserved for systems using bit-mapped graphics displays. A cursor that actually lives *between* two adjacent screen characters tells us exactly where a typed character would be inserted.

The example was borrowed from the *System Utilities* program, where this insert mode cursor is used in the input fields. Some other Pascal programs use this technique, but it turned out that it was fairly easy to implement in Basic as well (yay, Basic!). However, the way things were done last time was somewhat different from the *Utilities* implementation, and so the article concluded with some challenges to make the routine better and more useful in data-entry programs, as well as more like the way things work in Utilities. Shame on this column! This month's episode revisits the program and the previous column's parting challenges and delivers a more robust and useful version. For those of you who undertook to solve the problems raised last time, this will serve as a check on one way (not necessarily the best) to attack the solution.

Quick as a Wink. Just to refresh your memory, the way we attacked the problem of putting a cursor between two characters was to create two new sets of character-set definitions in which each character was moved to the left or right one pixel within the character cell (since most characters occupy five-by-seven dots within a seven-by-eight cell). A vertical row of dots was put into the vacant space left by shifting the character. By redefining two adjacent characters on the screen with left-shifted and right-shifted versions, we created two standard characters with a double-width bar between them, indicating where the character typed would go. To make things clearer, the bottom row of pixels was turned on as well, in the space normally occupied by the descenders of lower-case characters.

While this was a good first pass, the *System Utilities* program does several other things that make the input system easier to use and more legible. First, to draw attention to the cursor position, the program flashes the underline below the two characters, instead of leaving it constantly on. Secondly, the program handles the problem of the flashing underline destroying lower-case descenders by physically moving the character up one row so that the descenders are preserved. It can do this because only five lower-case characters have descenders (g, j, p, q, y) and in each case the character can be moved up without losing its appearance. Granted, the j loses its top dot, but life is like that.

In the following program, we'll first tackle the problem of making the underline "wink" (rhymes with blink) at us, and then look at a method of shifting up the five lower-case characters. To get the blinking underline, it's necessary to remember that the high-order bit in a character definition (the leftmost or most significant bit, some people would say) is used to control blinking for that line of pixels in the character cell, but only if the character is written in inverse mode. This means that you can have normal mode and either inverse or blinking, but not both.

Programming Inverse. The preceding information suggests a simple solution, namely to set the high-order bit of the last row of the cursor character definitions and print them in inverse mode. However, since we must print the whole character in inverse for the top seven rows to come out normally, it is necessary to create an inverse (black-on-white) character definition, which, when printed in inverse, will result in the normal white pixels on black. Fortunately, as we will see, inverting the character definition is much simpler than shifting it. Those of you with exceptional memories (or exceptional faithfulness to this column) will remember that this technique was covered when we created the character and shape editor in the February episode. Then, as now, the way to invert a bit pattern is to subtract it from a bit pattern of all ones. Thus:

```
  1111111      1111111
 -1001101     -0011101
 --------     --------
  0110010      1100010
```

In decimal, it's as simple as subtracting the value from 127, 255, or any other number that is all ones in binary.

Dividing Up the Work. One of the other challenges from last time was to divide the program into two parts, one that created the shifted (and now inverted) characters and the field definitions, the other of which used the character definitions to do data entry into the fields. The major reason for this division of labor was to avoid spending the time inverting and shifting the characters each time the data-entry program was run. Also, by building files of shifted character definitions, field names and specifications, it would be possible to use the same data-entry program to enter many different sets of data, depending on which definition file the data-entry program used. This is much more the way that real applications are built.

Since the details of the character-shifting process were fully described last time, the description of the following program will just note changes from the previous version:

```
10  DIM highr%(15),lowr%(15),
    carryr%(15),highl%(15),lowl%(15),
    carryl%(15)
15  DIM lchar$(127),rchar$(127),
    sleft%(255),sright%(255),char%(511)
20  DIM flname$(20),vert%(20),horz%(20),
    fstart%(20),fend%(20)
30  INVOKE"/basic/request.inv","/basic/
    download.inv"
35  PRINT"Initializing values, please wait"
40  GOSUB 4000
45  GOSUB 6000
```

This section uses the same routines at lines 4000 and 6000 to build the character definitions and field descriptions, but this time, instead of using these definitions immediately, the following program section writes this information out to a definition storage file:

```
50  INPUT"Storage file: ";a$
60  IF a$="" THEN 500
70  OPEN#1,a$
80  PERFORM filwrite(%1,@charset$,
    %1024)
90  WRITE#1,10;font$
100   FOR i=0 TO 127
110     WRITE#1;lchar$(i),rchar$(i)
120   NEXT i
130   WRITE#1,20;max.field+1
```

```
140  FOR i=0 TO max field
150  WRITE#1,fname$(i),vert%(i),
     horz%(i),fstart%(i),fend%(i)
160  NEXT i
170  PRINT"Information stored."
```

Line 80 writes out the character set that corresponds to the shifted definitions in lchar$ and rchar$. This ensures that the data-entry program will use consistent definitions for regular characters and redefined ones, no matter what font is selected in this program. After the character set is written out, the shifted definitions are written in lines 90 through 120. Note that the pathname of the original font is written for reference. In lines 130 through 160, then, field name definitions are written, along with the display location and length information. At that point this program is finished:

```
500  REM end of program
510  CLOSE:INVOKE
520  END
```

Most of the routine at line 4000, which builds the shifted character definitions, is the same as before. It is repeated so that you can re-create the whole program.

```
4000  DATA 0,2,4,6,0,2,4,6,8,10,12,14,8,
      10,12,14
4010  DATA 1,3,5,7,9,11,13,15,1,3,5,7,9,
      11,13,15
4020  DATA 0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1
4030  DATA 4,4,5,5,6,6,7,7,12,12,13,13,
      14,14,15,15
4040  DATA 0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7
4050  DATA 0,8,0,8,0,8,0,8,0,8,0,8,0,8,0,8
4100  FOR i=0 TO 15:READ
      highl%(i):NEXT:FOR i=0 TO 15:READ
      lowl%(i):NEXT
4110  FOR i=0 TO 15:READ
      carryl%(i):NEXT
4120  FOR i=0 TO 15:READ
      highr%(i):NEXT:FOR i=0 TO
      15:READ lowr%(i):NEXT
4130  FOR i=0 TO 15:READ
      carryr%(i):NEXT
4150  FOR i=0 TO 15:FOR j=0 TO 15
4160    sleft%(i*16+j)=16*(highl%(i)
        +carryl%(j))+lowl%(j)
4170    sright%(i*16+j)=16*highr%(i)+
        lowr%(j)+carryr%(i)
4180    NEXT:NEXT
4200  prompt$="Character font pathname: "
      :GOSUB 5000
4210  IF error THEN RETURN
4220  ON ERR GOTO 4260
4230  font$=CHR$(34)+a$+CHR$(34):
      charset$="char%"
4240  PERFORM getfont(@font$,
      @charset$)
4250  OFF ERR:PRINT"Font loaded":GOTO
      4400
4260  ON ERR GOTO 4300
4270  OPEN#1,a$:PERFORM filread(%1,
      @charset$,%1024,@ret%)
4280  IF ret%=1024 THEN OFF ERR:GOTO
      4400
4300  OFF ERR:PRINT a$" is not a valid
      character font file"
4310  IF TYP(1)=0 THEN
      CLOSE#1:DELETE a$:GOTO 4200
4320  CLOSE#1:GOTO 4200
```

The following shift preparation routines contain the changes for inverting the character set to allow for our blinking underline cursor:

```
4400  PRINT:PRINT"Preparing the character
      fonts"
4410  FOR i=0 TO 511 STEP 4
4415    k=i/4:lchar$(k)="":rchar$(k)=""
4420    FOR j=0 TO
        2:a$=HEX$(char%(i+j))
4430    l=TEN(MID$(a$,1,
        2)):r=TEN(MID$(a$,3,2))
4440    lchar$(k)=lchar$(k)+
        CHR$(127-sleft%(l)) +
        CHR$(127-sleft%(r))
4450    rchar$(k)=rchar$(k)+
        CHR$(127-sright%(l))+
        CHR$(127-sright%(r))
4460    NEXT j
4470    a$=HEX$(char%(i+3)):l=TEN
        (MID$(a$,1,2)):r=TEN(MID$(a$,
        3,2))
4480    lchar$(k)=lchar$(k)+
        CHR$(127-sleft%(l))+
        CHR$(256-sleft%(r))
4490    rchar$(k)=rchar$(k)+
        CHR$(127-sright%(l))+
        CHR$(319-sright%(r))
4500    NEXT i
4510  RETURN
```

Notice in lines 4440, 4450, 4480, and 4490 that the value of the individual row definition is first subtracted from 127 to form the inverse of the regular value. We use 127 (seven bits of ones) because we want the high-order (flash) bit to be left off on all rows but the bottom. The bottom row left is handled in line 4480, where subtracting from 256 not only inverts the bottom seven bits (the character's pixel definition) and inverts (turns on) the flash bit, but also (255+1) turns on the low-order bit to be consistent with the state of the other bits (remember

that sleft% forces the low-order bit to one for the cursor center line, and the invert operation performed by the subtraction turns it back off). Line 4490 performs a similar operation, except this time we must subtract from 319 (255+64), which has the effect of inverting all the bits and then turning the bit next to the flash (high-order) bit on. Trust it, it works!

The rest of the routine is very similar to the version from last time:

```
5000  PRINT prompt$;:INPUT"";a$
5010  IF a$="" THEN error=1:RETURN
5020  error=0:RETURN
6000  DATA 5
6005  DATA "Name: ",6,1,7,30
6010  DATA "Address: ",8,1,10,40
6015  DATA "City: ",10,1,7,26
6020  DATA "State: ",12,1,8,9
6025  DATA "Zip: ",14,1,6,10
6050  READ n:max.field=n-1
6055  FOR i=0 TO max.field
6060    READ flname$(i),vert%(i),horz%(i),
        fstart%(i),fend%(i)
6065    NEXT i
6100  RETURN
```

Descending Ever Upward. As was mentioned before, it is possible to modify the character shifting and inversion routine to more nearly match how the *System Utilities* program behaves. The following lines, when added to the preceding program, will move the definitions of the characters g, j, p, q, and y up one row of pixels so that a blinking underline can be used without distorting the character appearance. This has the disadvantage of making the character appear to bounce up when the cursor moves over it, but it's purely a matter of personal taste. The best way is to make the modifications and try creating both kinds of definitions. Use the one that makes the most sense to you. Anyway, here are the changes:

```
4432  IF k < 103 or j > 0 THEN 4440
4433  IF k <> 103 AND k <> 106 AND k
      <> 112 AND k <> 113 AND k <>
      121 THEN 4440
4435  lchar$(k)=CHR$(127-sleft%
      (r)):rchar$(k)
      =CHR$(127-sright%(r)):GOTO 4460
4472  IF k<103 THEN 4480
4473  IF k <> 103 AND k <> 106 AND k
      <> 112 AND k <> 113 AND k <>
      121 THEN 4480
4475  lchar$(k)=lchar$(k)+
      CHR$(127-sleft%(l))+
      CHR$(127-sleft%(r))+CHR$(255)
4478  rchar$(k)=rchar$(k)+
      CHR$(127-sright%(l))+
      CHR$(127-sright%(r))+CHR$(255)
4479  GOTO 4500
```

As you can see, it works by skipping the loading of the top row (line 4435) and adds an extra row (now the new bottom row), which consists of just a solid flashing line: the chr$(255) in lines 4475 and 4478.

Spreading the Word. Having created and stored the character definitions and the data-entry definitions, it's time for the data-entry program, which takes advantage of all this work. Because the next program follows almost exactly the program from last time (in the way it displays the fields and accepts data), only the changed portions will be described in detail:

```
10  DIM highr%(15),lowr%(15),
    carryr%(15),highl%(15),lowl%(15),
    carryl%(15)
15  DIM lchar$(127),rchar$(127),
    flname$(9),vert%(9),horz%(9)
20  DIM sleft%(255),sright%(255),
    char%(511),fstart%(9),fend%(9)
30  INVOKE"/basic/request.inv","/basic/
    download.inv"
40  GOSUB 3000
50  IF error THEN 2000
60  name$=".console"
70  blank$="
    :REM 60 spaces between quotes
75  lcursor$=CHR$(128):
    rcursor$=CHR$(129):
    cursor$=lcursor$+rcursor$
80  INPUT"Name of recording file: ";a$
85  IF a$="" THEN a$=".console"
90  OPEN#2,a$
```

Our first task after allocating the arrays is to read in the definitions from the file created in the previous program. That's done at line 3000 and looks like this:

```
3000  INPUT"Screen definition file: ";a$
3005  error=0:IF a$="" THEN
      error=1:RETURN
3010  charset$="char%"
3015  ON ERR GOTO 3900
3020  OPEN#1,a$
3025  PERFORM filread(%1,@charset$,
      %1024,@ret%)
3030  OFF ERR
3035  IF ret% <> 1024 THEN 3900
3040  PERFORM loadfont(@charset$)
3100  READ#1,10;font$
```

```
3105  FOR i=0 TO 127
3110    READ#1;lchar$(i),rchar$(i)
3115    NEXT i
3120  READ#1,20;n:max.field=n-1
3125  FOR i=0 TO max.field
3130    READ#1;flname$(i),vert%(i),
        horz%(i),fstart%(i),fend%(i)
3135    NEXT i
3200  PRINT"Information loaded"
3205  RETURN
3900  PRINT"Invalid definition file, try again"
3905  OFF ERR
3910  GOTO 3000
```

This routine reverses the process used to originally write the file and stores the information used by the data-entry routine in the appropriate arrays.

Glancing back up to the rest of the routine in lines 80 through 90, we now allow a file to be opened to store the data that will be input. The example used here is a simple one, and typically would have lots more complications, like creating keys and writing out data into a database structure, and so on. But for now the example given simplifies the issues. Notice that the default is the screen (.console), giving a convenient way to test that the data we see is really the data that was accepted as input.

Next we come to the input routine itself, which was heavily described last time. It basically cycles through all the fields and accepts data while displaying the "insert mode" cursor created by the new character definitions.

```
500  HOME
505  FOR field=0 TO max.field
510    VPOS=vert%(field):HPOS=horz%
       (field):PRINT flname$(field);
520    flen=fend%(field)-fstart%(field)+1
530    cpos=1
540    value$=MID$(blank$,1,flen)
550    HPOS=fstart%(field):PRINT value$;:
       HPOS=fstart%(field)+cpos-1
560    IF cpos>1 THEN 590
570    rval%=ASC(MID$(value$,1,1))
575    ctrlist$=CHR$(1)+CHR$(1)+
       lchar$(rval%)
580    PERFORM control(%17,
       @ctrlist$)name$
585    INVERSE:PRINT rcursor$;
       :NORMAL:GOTO 650
590    lval%=ASC(MID$(value$,cpos-1,
       1)):rval%=ASC(MID$(value$,cpos,
       1))
600    ctrlist$=CHR$(2)+CHR$(0)+
       rchar$(lval%)+CHR$(1)+lchar$
       (rval%)
610    PERFORM control(%17,
       @ctrlist$)name$
620    HPOS= HPOS-1:INVERSE:PRINT
       cursor$;:NORMAL
650    GET a$:a=ASC(a$)
660    IF a<32 OR a>127 THEN 800
670    IF cpos=flen THEN 750:ELSE:IF
       cpos>flen THEN 650
675    SUB$(value$,
       cpos+1)=MID$(value$,cpos,
       flen-cpos)
680    SUB$(value$,cpos)=a$
690    cpos=cpos+1
700    GOTO 550
750    SUB$(value$,cpos)=a$:IF cpos=1
       THEN 760
755    HPOS= HPOS-2:PRINT
       MID$(value$,cpos-1,1);
760    lval%=a:ctrlist$=CHR$(1)+
       CHR$(0)+rchar$(lval%)
770    PERFORM control(%17,
       @ctrlist$)name$
780    HPOS=fend%(field):
       INVERSE:PRINT lcursor$;:
       NORMAL:cpos=cpos+1:GOTO 650
800    IF a>127 THEN a=a-128:GOTO 900
805    IF a=9 THEN 970
810    IF a <> 8 THEN 830
815    IF cpos=1 THEN 650:ELSE IF
       cpos<flen+1 THEN 825
817    HPOS= HPOS-1:PRINT
       MID$(value$,cpos-1,1);
820    HPOS= HPOS-1:
       cpos=cpos-1:GOTO 560
825    HPOS= HPOS-2:PRINT
       MID$(value$,cpos-1,2);
827    cpos=cpos-1:HPOS= HPOS-2:
       GOTO 560
830    IF a <> 21 THEN 860
835    IF cpos > flen THEN 650:ELSE IF
       cpos=flen THEN
       a=ASC(MID$(value$,cpos,
       1)):GOTO 755
840    IF cpos=1 THEN HPOS=
       HPOS-1:PRINT MID$(value$,cpos,
       1);:GOTO 850
845    HPOS= HPOS-2:PRINT
       MID$(value$,cpos-1,1);:HPOS=
       HPOS+1
850    cpos=cpos+1:GOTO 560
860    IF a=13 THEN SUB$(value$,cpos,
       flen-cpos+1)=
       blank$:cpos=1:GOTO 550
870    IF a=27 THEN 990
875    GOTO 650
899    REM routine below handles "open-
       apple" keys
900    IF a <> 8 THEN 920
905    IF cpos=1 THEN 650
910    SUB$(value$,
       cpos-1)=MID$(value$,cpos)+ " "
915    cpos=cpos-1:GOTO 550
920    IF a <> 21 THEN 650
925    IF cpos>flen THEN 650
930    SUB$(value$,cpos)=MID$(value$,
       cpos+1)+" "
935    GOTO 550
969    REM put value into the result array and
       get next value
970    HPOS=fstart%(field):PRINT value$;
980    result$(field)=value$
985    NEXT field
```

Notice that in lines 585, 620, and 780 we now turn on inverse mode, print the cursor characters, and then turn normal back on. This, in combination with the high bit "on" in the character's bottom row, creates the flashing underline we want. After all the fields are filled (remember that tab gets us to the next field and escape jumps out of input mode), we write out the results in the storage file:

```
990   REM end of input cycle, write out results
1000    PRINT:PRINT
1005    FOR i=0 TO max.field
1010      PRINT#2;result$(i)
1015      NEXT i
1020    PRINT"Record written"
1030    INPUT"Continue? ";a$
1035    IF a$="" THEN 500
1040    a$=MID$(a$,1,1):IF INSTR("Yy",
        a$) THEN 500
```

The routine from lines 1005 to 1015 probably needs to be much more complicated to be useful. After prompting to see if there are more records to be entered, line 1040 either takes the user back for more input or terminates using the next routine.

```
2000  stdset$=CHR$(34)+"/basic
      /standard"+CHR$(34)
2005  PERFORM getfont(@stdset$,
      @charset$)
2010  PERFORM loadfont(@charset$)
2020  CLOSE:INVOKE
2030  END
```

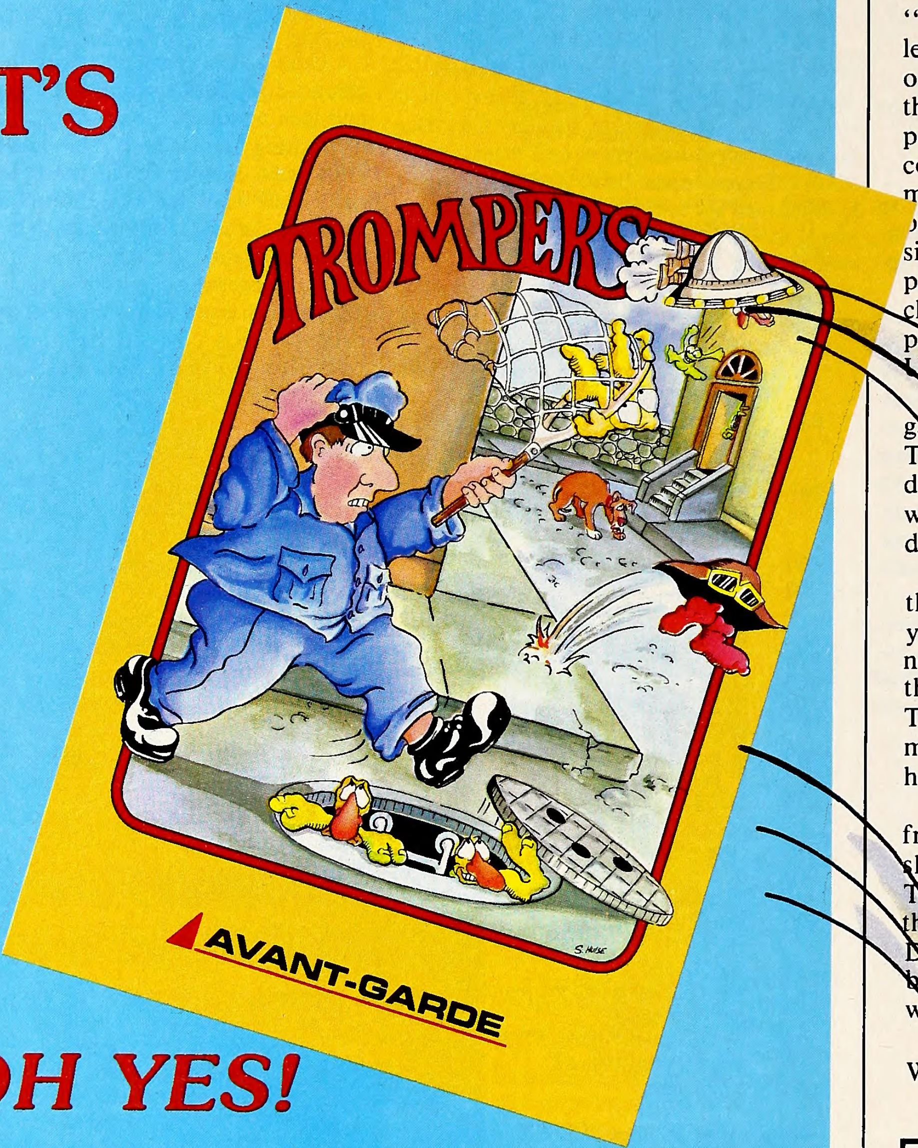
Lines 2000 through 2030 load the standard character set back using getfont and loadfont and then terminate the program.

Exiting Data Entry. The data-entry program, with its nice field-handling capabilities, can be the basis for lots of applications. Because the definition of the data to be entered is stored separately from the data-entry program itself, one program can truly serve many needs. This is much more characteristic of the way real database query and update programs work, with one piece of program code operating on lots of different database definitions. One thing that would make this combination much more useful would be modifying the definition program to allow the input and editing of the field definitions, rather than having to type them into data statements. You might even want to store the field definitions in separate files, since one set of character definitions would serve many different sets of fields and would save considerable disk space as well.

Tune in next time for a special treat, as this column brings you some news that will delight every Apple III owner (and make some of you Apple II owners a bit jealous!). Till then. . . .

OH NO!

IT'S



OH YES!

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NEW from AVANT GARDE

IMPORTANT SUBSCRIBER NOTE

We wish it clearly noted that the "TROMPERS" advertisement to the left has expanded past the boundaries of its ad space. Further, the Trompers themselves are taking over this entire page! Is that fair? Well, is it? There could be a perfectly fine advertisement here for modems or RAM boards or dust covers--something sensible. But, NO! Instead, there i proliferation of intergalactic chamacallits bouncing all over place--here and in stores all across United States. They're taking over!

Okay, okay, so what if it's a great game? Who cares if it's lots of fun? That's hardly the p is it? We dont' care if young p and adults wi joy it. No! W don't, don't, don

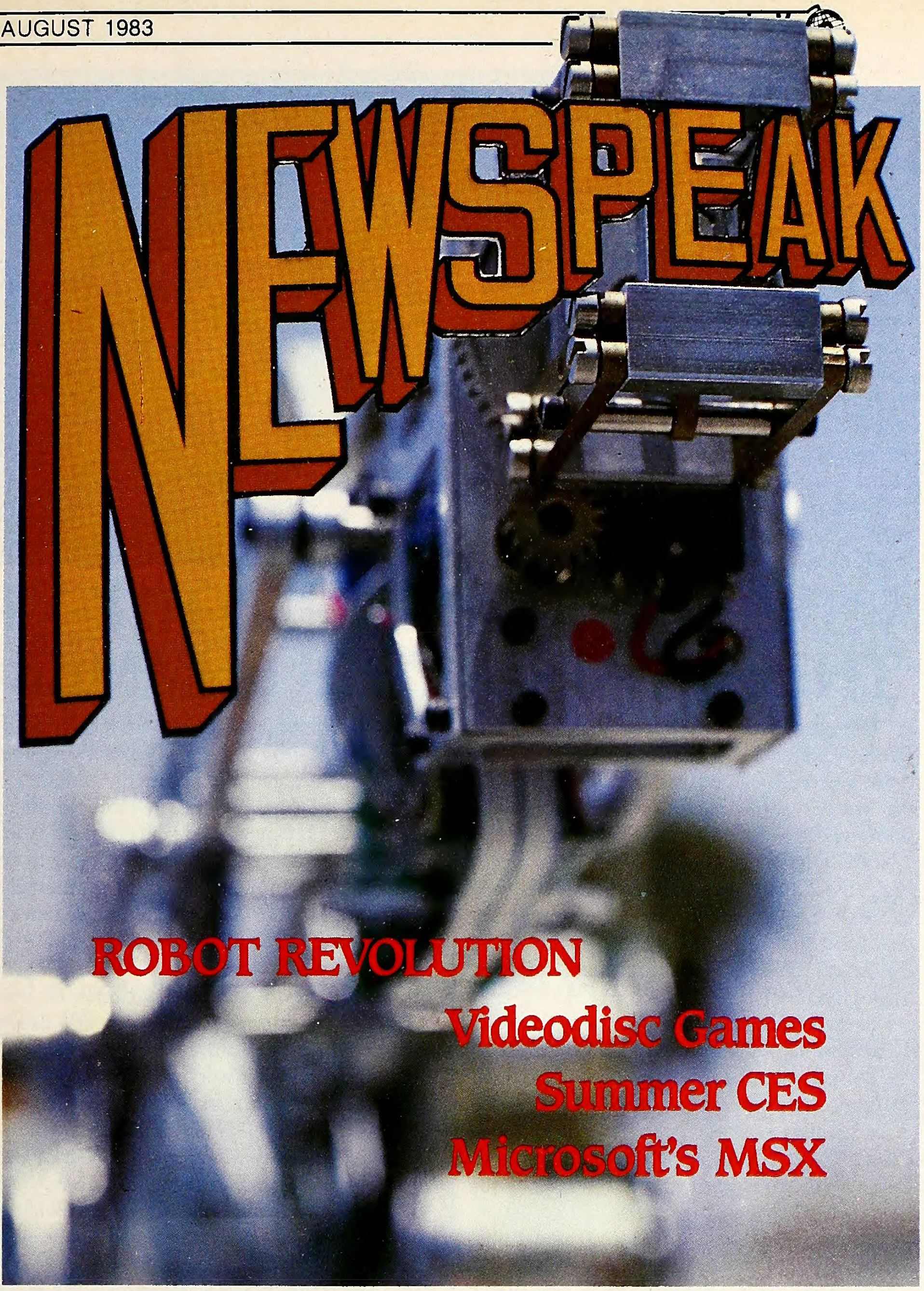
The s that this is not their ad space. I know you don't re care about it now, but just until they take over thing. Think about t o more govern ment. No mo fire people. No human movies stars.

We'll be buying ha from McTrompers, shirts with littl Trompers sewn on them, ice cream fr Daily Trompers, w by staying at Ho pers when we're on

Where's it all g g to end uh? Where?

THE AVANT GARDE GAMES HIT LIST

This Week	
1	**JUMP JET** (Apple)
1	**HI-RES COMPUTER GOLF 2** (Apple)
1	**LAZER MAZE** (Apple, Atari, IBM PC, Commodore, VIC 20, TI 99)
1	**TROMPERS** (Apple)
1	**TRIPLE ARCADE INSANITY** (Apple)
1	**DEATH RACE** (Apple)
1	**FEDERATION** (Apple, IBM PC)



IBM BUYS STOCK FOR THE FUTURE

Always unpredictable, on the leading edge of technology and business strategies, International Business Machines bucked the buy-out and merger trends of 1982 when it bought minority shares in two high-technology companies earlier this year.

A month and a half ago, Armonk, New York-based IBM bought 15 percent of Rolm Corporation, a Silicon Valley-based manufacturer of business telephone switching systems. In February, IBM bought 12 percent of Intel Corporation, the semiconductor and microprocessor company whose chips IBM buys by the railroad carload. The price of the two purchases came to slightly less than $500 million.

Considering the buy-out trend of 1982, many wondered why IBM didn't take the big plunge—Intel, Rolm, and the antitrust laws willing—and purchase the two companies outright. With $35 billion in yearly sales, the computer giant could have afforded it.

In both cases, a full takeover was not considered by either party. Independence, not antitrust, was the primary reason for this strategy. IBM doesn't want to stifle or have too much influence on the motivation driving two such important independent suppliers as Intel and Rolm. Future profits are at stake.

Intel needed capital to keep up the pace of its research spending. Making the company a division of IBM—captive to a single customer—would have ended Intel's competitive service to a demanding marketplace. As they say, "Domesticated animals sleep a lot."

Internally, IBM showed an understanding of the problem when it set up International Business Units (IBUs) two years ago. The IBUs are identical in every way to a start-up company—formed and staffed by entrepreneurially minded people who decide whether to go outside IBM for parts or service or use the company's own facilities. There are now twelve IBUs, taking IBM into such diverse fields as medical electronics and robotics.

IBM's coming head-on clash with AT&T motivated the Rolm buy-in. Rolm has installed twelve thousand switchboard systems in the United States—second only to AT&T, which is freeing itself from public-utility status in order to compete with IBM in the booming data communications industry. Fast-growing Rolm sought out IBM, seeing the possibility of the two being able to jointly displace AT&T in the so-called office of the future.

The decentralized buy-in strategy of IBM may be a solution to a recognized problem of U.S. business—how to marry the innovativeness of small companies with the financial, marketing, and manufacturing muscle of large corporations. DH

ROBOTS AND AUTOMATION CHALLENGE OUR ABILITIES TO GROW AND ADAPT

"You will be happy, sir," the mechanical promised him cheerfully. "We have learned how to make all men happy, under the Prime Directive. Our service is perfect, at last. Even Mr. Sledge is very happy now."

Underhill tried to speak, and his dry throat stuck. He felt ill. The world turned dim and gray. The humanoids were perfect—no question of that. They had even learned to lie, to secure the contentment of men.

—"With Folded Hands" by Jack Williamson

Science-fiction writers have long been exploring the good and bad aspects of a future mechanized society, where robots and automatons do most of the work and humans do what they please.

In Jack Williamson's classic 1953 short story, "With Folded Hands," a brilliant scientist creates a race of perfect humanoids programmed to follow the Prime Directive—"to serve and obey, and guard men from harm." The scientist's plan goes disastrously awry when the humanoids start implementing the Prime Directive too literally.

Virtually all activities are eventually deemed too dangerous for humans and the robots gently insist on having their way. Humans become "pampered prisoners" in a "highly efficient jail." Purpose and hope die, replaced by a sense of "utter futility." The robots go so far as to alter the minds of those who cannot accept the new way of life,

GOTO page 270, column 2

This page: scenes from Don Bluth Productions's animated video arcade game *Dragon's Lair*. Right, Dirk encounters one of the game's forty-two perils; below, Dirk the Daring and the lovely Princess Daphne.

VIDEODISC GAMES TO HIT THE ARCADES THIS SUMMER

Get ready for a whole new gaming experience—interactive "minimovies." The first of these videodisc–video game hybrids should hit arcades sometime in midsummer, with home versions expected to follow in about a year. The latest attempt to boost the slumping game industry, interactive minimovies will combine the usual computer-generated game character, such as a spaceship or warrior, with live-action or animated backgrounds stored on a laser disc.

Several Hollywood film companies—Paramount, MCA-Universal, Don Bluth Productions, Columbia, Warner Bros., and Lucasfilm—hope to cash in on the multibillion-dollar gaming business, providing the ingredient they offer best: movies. The minimovie enables the production of superior graphics and increased story possibilities, as well as better advanced tie-ins between video games and theatrical films.

According to a spokesperson at Paramount, who has struck up a partnership with Sega, the added visual reality that comes from using videodiscs could even lead to the preproduction planning of footage for use in both the movie and the tie-in game.

Some game executives see the arcade owner becoming comparable to the theater exhibitor who books a film every week. The arcade owner would simply change the minimovie disc on the videodisc machine hidden inside the coin-op cabinet. "Coming soon" and "now playing" signs could even be attached to the sides, the games becoming, in effect, ancillary movie houses.

But is the price right? The willingness of kids to deposit fifty cents into the machines and the initial investment by arcade owners into the videodisc equipment will obviously be determining factors in the box-office success of these minimovies.

Testing of the minimovie coin-ops has already begun in some cities. The Yellow Brick Road Arcade in San Diego, California, is currently previewing the Sega/Paramount laser-disc game *Astron Belt*. Developed by a Japanese firm, the game is reportedly doing "extremely well," having already scored a major success in Japanese and European arcades. Kids are lining up in droves just waiting to deposit their two tokens. *Astron Belt* features a computer-generated spaceship flying against a special-effects-created space background originally imaged on film stock.

According to Brenda Mutchnick of Sega Games, "We hope to release a few new games of this type by the end of the year. We don't know if *Astron Belt* will be one of them. Even though it's scored a major success in Japan, when we got a look at the game here we didn't feel the game play was as good as that of current home computer games. We are now redesigning the cabinet itself and are awaiting future software developments with our own titles."

Don Bluth Productions will unveil an interactive coin-op game—*Dragon's Lair*—sometime this summer. Created by Bluth and Advanced Microcomputer Systems (AMS), the new game will be marketed to arcades under the Starcom banner. The head of AMS, Rick Dyer, began developing the technology for *Dragon's Lair* some years ago.

GOTO page 273, column 1

Showgirls, Splash, Finesse, Not Much Else

Summer CES Wows the Crowd With Glitter and Big Talk

The second in a series of unintentional ironies is over. The seventeenth year of the Consumer Electronics Show (CES), held at Chicago's McCormick Place this past June 8, ended without a great deal of fanfare—amidst rumors of disappointing attendance. As with the Las Vegas CES in January, the emphasis in Chicago was on merchandising, with microcomputer software showing strength, if not originality.

CES is a trade show, closed to the idle consumer or child, although plenty of both were evident. It is meant to be a showcase for new products in the electronics industry, and a place where vendors and dealers can meet and hash out mutually beneficial arrangements. This year, for the first time, software was in such abundance that a separate building was devoted to computers and related products.

The talk of the show was the new Coleco computer, the Adam. This self-contained "family computer system" comes with keyboard, 80K of RAM, letter-quality printer, and a "digital data drive." The magnetic tape drive stores half a megabyte, and Coleco claims it has transfer speeds comparable to those a floppy disk drive can achieve. Demos that ran constantly asserted that the new computer was capable, figuratively speaking, of leaping tall buildings in a single bound, but the salespeople in the booth seemed reluctant to discuss particulars.

Atari also had some new machines to show: the 600XL, 800XL, 1400XL, and 1450XL. These are all new, slim machines—in varying configurations ranging from 16K RAM to 64K RAM—complete with the long-awaited new disk drives and lots of peripherals. The new lineup is intended to replace the current crop of Atari micros and to be fully compatible with existing software. Also announced by Atari at CES was the launching of software endeavors for machines other than their own, including products for Apple, IBM, and Commodore computers.

Among the more eye-catching exhibits at CES was the new Datamost booth—in a carnival-tent setting with an atmosphere to match. Featuring Captain Sticky, a *Real People* refugee, and a swarm of scantily clad hostesses, the booth attracted large numbers of viewers who seemed to pay little or no attention to the products being displayed. While the sideshow was amusing, it also was a sad commentary on the show in general—sometimes little emphasis was placed on the products for sale, while a good deal of money was spent on attracting attention.

A different side of the same coin was apparent in the presence of newcomer Electronic Arts, a software firm composed of former employees of Apple, Atari, and other microcomputer companies. At the Electronic Arts booth, marketing and product seemed to go hand in hand. The quality of wares seemed uniformly solid, while the marketing was innovative without being overbearing. Electronic Arts seems to have taken its cue from the record industry and is working to make stars of its authors, as well as turning stars in other fields into authors of software. The current crop of authors includes Bill Budge, Dan Bunten (of *Cytron Masters* fame), Mike Abbott and Matt Alexander (formerly of Cavalier Computing), and a number of other familiar faces. Equally intriguing is Electronic Arts's upcoming crop of new authors, including cartoonist Gahan Wilson and a couple of giants from the NBA—Larry Byrd and Julius Erving. No kidding!

One of the more interesting pitches came from Romox Corporation, marketers of a new point of sales approach for video game sellers: The Terminal. This device allows dealers to download software onto reprogrammable cartridges. Romox claims this will take care of the inventory control demon that plagues dealers who have a tendency to overstock video games. Of greater interest will be the software that is to be downloaded.

TG Products unveiled some new game software for the Atari computers, along with some new paddles. Wico had a prototype mouse attached to an Apple and was busy trying to convince onlookers that the hardware was responsible for tricks performed by the software that was running. Activision was giving sneak previews of its Atari microcomputer games. Twentieth Century-Fox was pursuing the movie-to-video game chimera with its *Porky's* games. Epyx passed out canvas painter's hats.

Broderbund exhibited several new games, including *Lode Runner*, which might well have been the best of the show. Synapse also showed several new titles, as did Sirius. Datasoft showed off its new crop of low-priced software, the Gentry line, along with *Zaxxon* on the Atari and Apple.

In short, there were a lot of familiar faces, companies that have moved away from the Applefests and other consumer shows and have taken their place in the mainstream marketplace alongside firms like Mattel, Parker Brothers, CBS, Fox, Coleco, Imagic, Activision, Atari, and others.

Amidst all the hype and merchandising, the software seemed to stand still. There was nothing truly original or exciting at the show, or at least nothing that was out in plain sight. The primary topic of conversation among reps, publishers, dealers, and distributors was the "software glut." The proliferation of titles, all variations of several familiar and time-worn themes, refused to shine.

Robots

continued from page 267

thereby ensuring that everyone is "happy."

An extreme forecast, to be sure. But Williamson's story brings into focus issues that our species must address if it plans to continue automating the workplace. What happens to a worker who is suddenly replaced by a machine? What happens to the twenty-year vet of an assembly line who must either change jobs or become little better than a parasite feeding on society—with no pride and no direction in life?

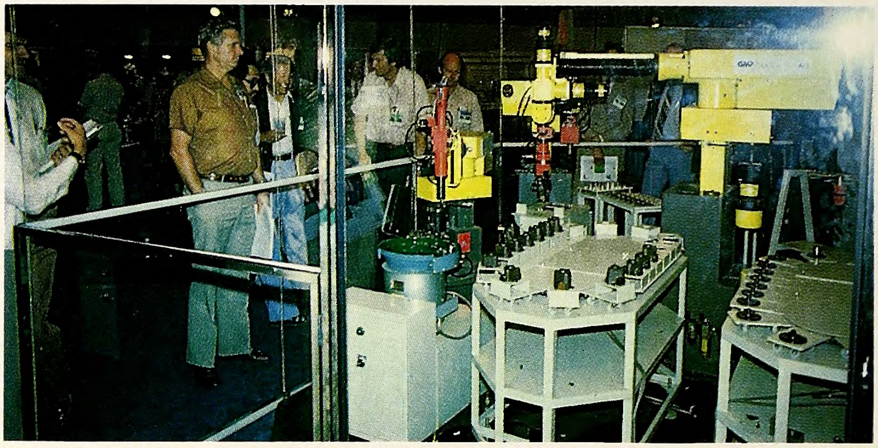
In the future, more and more factory workers will be replaced by machines. No one seriously contemplates doing this all at once. Robotics technology is steadily progressing, but humans are still infinitely preferable to machines in most cases. There are only twenty to thirty thousand robots currently in use in this country. That will change, though.

The economy and the job market are changing, as they always have. Society and people changed a hundred years ago, when the shift from an agricultural-based economy to an industrial-based economy went into full swing. Now we are shifting toward an information-based economy. Our heavy industries are in decline and automation is perceived as the best way to salvage some form of competitive edge.

Robots and automation hold great promise. There are many, many jobs—despite popular romanticized notions—that wear down, demean, and generally diminish human beings. But in the short run—the next twenty to thirty years—the amount of people displaced by robots poses a difficult problem: what to do with the unemployed workers.

The party line on displacing workers through automation calls for retraining those who are affected. Surely, as automation takes over and increases production, there will be a need for more office personnel and workers to maintain the automatic machinery. Both labor unions and industry leaders have agreed that retraining is one possible option. But will retraining work on the human level?

For twenty years, Johnny Detroit worked in an auto plant physically attaching windshields to hundreds of cars a day. In 1992, his job was taken over by a new, sophisticated automaton that could do the job faster and more accurately. Johnny Detroit was first offered a job on the maintenance and programming crew of the plant. He spat at the offer. "I'm not becoming a nursemaid for some damn robot," he said.



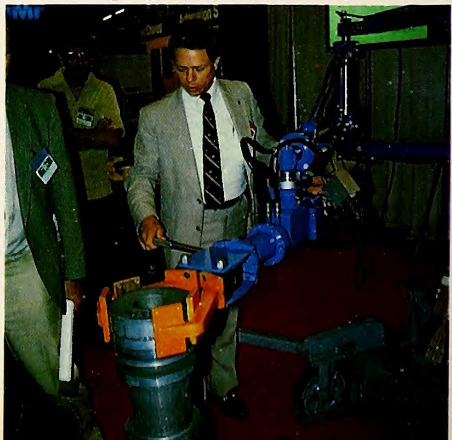
Photos by Dave Hunter

Attendees at IneRobot '83—held June 14-16 in Long Beach, California—take a look at future mechanical workers. The robot market is currently sluggish, but the technology continues to advance. The next twenty years will see robots steadily replacing factory workers in our heavy industries. But not all robots will replace humans on the job. Below, Positech Corporation's Taurus heavy-duty positioning arm is a robotic device operated by a human, allowing the easy positioning of objects weighing from 200 to 1,000 pounds.

So Johnny took a job in the data processing department. Thirty-five hours a week he sat in front of a computer terminal doing mindless, back-numbing, unchallenging work. Sure, a wage is a wage. But Johnny now had a "soft" job. A victim of habit and all he had previously experienced, Johnny soon came to miss the days when he worked on the assembly line. In those days, at least, he was physically active.

Depressed and broken, Johnny wasted away his life—not noticing and not appreciating the benefits of his new career. He was like thousands of emigres who have come to this country speaking a different language—locked into a different cultural template. He was a stranger in a strange land and he could never quite adapt.

Too dramatic, you say? Don't kid yourself. An isolated incident? Not likely. The way robotics is progressing, a hundred years from



now there may be more nonfactory robots than robots on the assembly lines. Robots could fill all the potholes and lay all the drainage pipes. Robots could replace bank tellers, taxi drivers, newsstand vendors, soda jerks, janitors, firefighters, mail carriers, hair dressers, truckers, restaurant cooks, railroad workers, and farm hands. The technology is within our reach to realize these and many more kinds of robot applications.

Already we have walking, talking, seeing, hearing, and smelling robots. We have robots that can calculate faster than any human. What robots can't do yet is think for themselves; they are capable of only a limited kind of learning. But then advances in artificial intelligence may change all that sometime in the next century.

Just as computers have made the transition from the offices of only the largest companies to small businesses and homes, so will robots become more common in everyday life. Depending on the scenario, the long-term effects caused by robots and automation could be the real story.

The bottom line is, can we humans keep adapting and progressing as we make sweeping changes in the workplace and the job market? Are we attempting too much? Will the world truly be a better place once all the dangerous, dull, and degrading jobs have been taken over by machines? Will we all be happy as politicians, artists, office workers, and businesspeople?

Nobody can really answer those questions today. But we can try to influence the future and anticipate the results of our present actions. It has always been a dream of some people to free man from the physical tasks required to keep us alive. Is it a good dream?

Ask Johnny Detroit, who honestly enjoyed working with his hands. And ask his children, who never considered working in a factory.

Like any new technology, robotics, computers, and automation are bound to change our world. It's up to us to drive the technology, not be driven by it.

If we don't, a scenario similar to that found in "With Folded Hands" may come to pass, with the only difference being that a technological elitist group would be controlling the robots. The rest of us would either be faced with the prospect of getting used to doing nothing or submitting to mind-altering drugs in order to be "happy." Neither alternative is pleasant to contemplate.

"No, there's nothing the matter with me," he gasped desperately. "I've just found out I'm perfectly happy, under the Prime Directive. Everything is absolutely wonderful." His voice came dry and hoarse and wild. "You won't have to operate on me."

The car turned off the shining avenue, taking him back to the quiet splendor of his home. His futile hands, clenched and relaxed again, folded on his knees. There was nothing left to do. DH

Bits, Bytes, & Buzzwords

PBS Series Brings Computers And Their Uses Down to Earth

If your grandmother and your nontechie boss are still wondering what it is you do with your personal computer, you might alert them to a PBS television series making the rounds this summer and fall. *Bits, Bytes, & Buzzwords* is a five-part television series that attempts to cut through the jargon and market confusion and introduces the world of personal computing to the computer illiterate.

Produced by KQED—a PBS station in San Francisco—in conjunction with Power/Rector Productions, *Bits, Bytes, & Buzzwords* is hosted by Emmy Award winner Jim Hartz, who has hosted such programs as *Over Easy* and NBC's *Today* show. Major funding for the show was provided by CompuPro.

The first of the half-hour shows features an introduction to computer hardware—terms and basic components—as well as an introduction to software and the process of selecting machines for personal and business applications. The second installment concentrates on "the big three"—word processing, database management, and spreadsheets.

An introduction to accounting programs and a discussion of the new relationship of accountants to computers makes up the third show in the series. Graphics, games, and educational applications are addressed in the fourth edition.

The final segment concerns telecommunications and the problems potential personal computer buyers may experience with dealers and manufacturers.

Bits, Bytes, & Buzzwords was released to PBS stations around the country July 1 and will be appearing on 80 to 90 percent of the network's stations. Check your local program listings or call your local PBS station for the times.

Japanese Software Industry Will Get Benefits from MSX

One thing that most American small-computer manufacturers have learned in the last half a dozen years is that software sells machines. Computers are complex tools and software programs are analogous to the complex sets of instructions needed to use them.

The Japanese have known this too, but have been slow to develop a software industry. Microsoft—purveyor of flight simulators, SoftCards, operating systems, and microcomputer languages—has announced a set of specifications that, through standardization, should help the Japanese develop a viable domestic software industry faster.

Called MSX, Microsoft's "program solves a major software marketing and development problem," says Bill Gates, chairman of the Bellevue, Washington-based company. "In the past, software had to be modified for each new computer. Now, with these specifications, software developers and consumers can be assured of greater software/machine compatibility."

More than a dozen Japanese manufacturers—including Canon, Fijitsu, Hitachi, Mitsubishi, Sony, Toshiba, and Matsushita—have signed up for MSX, as has one American company, Spectravideo. The hardware components of MSX include the computer's microprocessor and instruction set, input/output ports, a video processor, joystick interface, and ROM cartridges. MSX specifies a Z-80 eight-bit microprocessor, a Texas Instruments 9918 video-display processor chip, and Microsoft's Basic language interpreter.

The MSX concept was originally developed by Matsushita and NEC in Japan and Spectravideo in the United States. Microsoft became involved initially to provide a common version of the company's Basic interpreter.

"This effort will also open the Japanese home-computer market to software companies in the United States and Europe," says Gates.

At the same time, many are wondering if MSX will aid the Japanese in moving into the American microcomputer market. The general consensus is that MSX will benefit the Japanese companies on their own soil but that its effect on the American market will not be felt for years, if at all.

One reason for this feeling is the gradual move by American computer manufacturers away from eight-bit systems to more powerful sixteen-bit processors and software. Texas Instruments, Atari, and other American firms are expected to introduce sixteen-bit software as early as next year.

Clive Smith, an analyst for the Yankee Group, a Boston market research firm, said in the *Wall Street Journal* on June 17 that, if the Japanese have standardized for the less powerful market, "it will be relatively painless to do it for the sixteen-bit market." If this occurs, the Japanese will clash head-on with American firms in the U.S. market. DH

Computer Tracks Truant Students

Countless classrooms across the country now use computers to run educational software—everything from simple drill and practice programs to sophisticated simulations. Educators are incorporating computers into the regular curriculum, and computer literacy and programming courses for students of all ages are becoming increasingly common. In light of these developments, the fact that two high schools in the Los Angeles Unified School District recently acquired two different models of a new computer system isn't terribly noteworthy.

Or maybe it is. The computer systems at Lincoln High School in Los Angeles and Canoga Park High School in southern California's San Fernando Valley aren't used to run educational software or in teaching computer literacy or programming; in fact, they aren't used in the classroom at all. Rather, these machines are located in the attendance offices at the two schools and represent an attempt by the school district to reduce truancy and improve classroom attendance.

Here's the arrangement. Each day, the names and phone numbers of absent students are entered into the computer. Working between the hours of 6:30 and 9:30 p.m., the computer telephones the students' homes, dialing automatically. It is programmed to try as many as three times during the evening before giving up. When a connection is made, the computer plays a prerecorded message from the school principal notifying the person who answers the phone of the student's absence. It also asks that the parent call the school or send a note with the student the next day to explain the absence.

Before the schools implemented the computer systems, guidance counselors and attendance workers attempted to contact the parents by telephone. But since the callers and the majority of parents worked during the day, the notification success rate wasn't particularly high. Because the computer can work at night when more parents are likely to be home, it succeeds in reaching a great many more parents than the human callers were able to. In addition, automation speeds up the process; a call can be dialed and completed within one minute, and, as a consequence, more attempts to reach parents are made. JV

Videodiscs

continued from page 268

Bluth, a former Disney animator, and his staff of ex-Disney artists have provided high-quality classical animation for *Dragon's Lair* in the same style as their feature-length animated film *The Secret of NIMH*.

Bluth says that the minimovie games herald a true marriage of art and technology. By combining the unique capabilities of computers with animated film, they've not only opened the door to a new realm of uses for character animation, but have developed a new form of entertainment—"participatory movies." Furthermore, he points out a heretofore unexamined relationship between the computer program and the user. "Because of the human shapes and the elaborate, full artwork," he explains, "the game is easier to watch for extended periods of time.

"With the three-dimensional drawings, the conflicts and threats seem closer to actual human experience. Also, the viewer is constantly being trained to be wary of the innumerable threats that surround him. In these ways, the computer ends up giving more back to the game player."

The *Dragon's Lair* scenario follows Dirk the Daring on his quest to rescue the lovely Princess Daphne from the clutches of an evil dragon. An often clumsy knight, Dirk braves room after room infested with all manner of perils, forty-two in all.

All the characters—Dirk, princess, and monsters—are classically animated, using fully detailed background artwork accomplished with multiple passes of film through a camera for purposes of special-effects "burn-ins." The visual look of the game includes characters' shadows, reflections, and a careful orchestration of color to achieve emotional impact. A minimum of twelve character drawings were used for every second of film.

"The scenarios, so far, contain two scenes that the computer selects, depending on the skill of the player," says Bluth's animation director Gary Goldman. "The choices currently are fight or flight, using an action button to actuate Dirk's magic sword or a joystick to move him from room to room. In future games, we'll branch out to several different obstacles for stories that have alternatives other than death or running away."

Unfortunately, users don't have the kind of object control in *Dragon's Lair* that they are used to having on standard video games, a la *Pac-Man*. Also, curious time-lag blackouts plagued the prototype copy; Goldman said these would be eliminated in the arcade versions.

Additional games are already under development at Don Bluth Productions. A space game, tentatively titled *Space Ace*, involves a fourteen-year-old nerd who becomes physically energized at certain moments, like Jerry the Mouse in Tom and Jerry's *Doctor Jekyll and Mr. Mouse*. A sequel to *Dragon's Lair* may also be in the works, depending on the original's popularity. A home version of *Dragon's Lair* is under way at Coleco, tying the game into a home laser-disc player. It should be ready by next year.

Other studio games companies are looking at the home minimovie game market as well. Former MCA Videodisc president Jim Fiedler, who's now in charge of MCA Video Games, announced two disc titles developed by MCA and Optical Programming Associates. The first, *Maze Mania*, was released this past May and consists of four minigames: a space game called *Blast Off*, a western titled *Shoot Out*, a haunted house game called *Nightmare Castle*, and a football scenario dubbed *1st and 10*. The games are composed entirely of live-action and animation sequences, originally shot on 16mm film by Bosustow Productions. Stock footage from *Battlestar Galactica* and NASA comprises some of *Blast Off*'s effects sequences.

"The games were developed as entertainment shows that allow users of the interactive Pioneer and Magnavox discs to operate the fast-forward, stop-frame, backward, and frame-counter features on the disc players," says Nick Bosustow, president of Bosustow Productions. "The disc companies' logic is that if buyers spend $700 for players, they'd like to deliver programming that would enable them to use all of the interactive features."

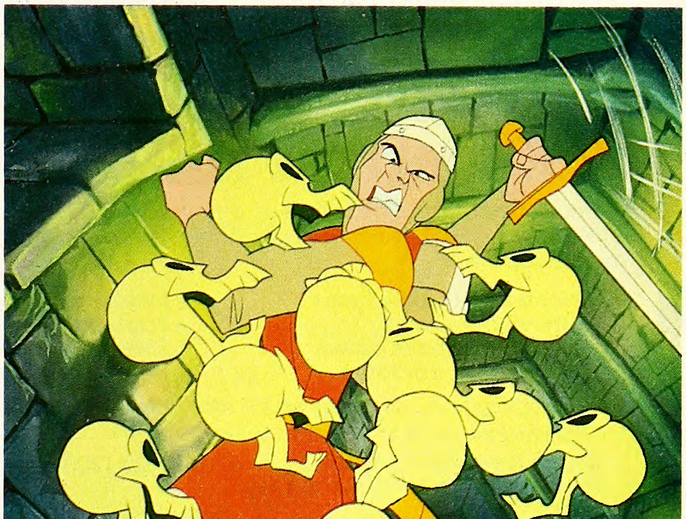
During a game, the disc automatically stops and asks the player questions related to the show he's involved in. The object of the four games is to get the highest score by correctly answering as many questions as possible. Getting too many wrong answers leads players to dead ends in the stories. "What most of the people will do is play the game wrong because it's much more fun to see the silly answers," explains Bosustow.

Maze Mania was actually begun two years ago, so now the questions and answers may seem too simplistic to some players. Each

game has only correct and incorrect answers. According to MCA programming executive Phyllis Bagdadi, a future game that's set in Hollywood (tentatively titled *Quest*) will be more random-based as far as questions go.

MCA has a joint venture with Atari to spawn licensed games from Universal's vast film library. Some will more than likely be videodisc games, indicates MCA's Fiedler, especially in view of the fact that the company was at one time in partnership with Pioneer to manufacture the Discovision laser-disc system. Since Fiedler himself was formerly involved with the company, it's logical for the disc avenue to be exploited by MCA. Further down the line, MCA's partnership with Atari—called Studio Games—will include the production of coin-op and home computer laser-disc titles.

Atari has a joint-venture licensing agreement with Lucasfilm. While both companies are adopting a strategic "wait and see" philosophy in terms of watching the learning curves of their competition, Atari VP of marketing Don Osborne reported that the king of game companies should move into the field by year's end. LPR



Above, the success of the new videodisc "minimovie" arcade games depends on the willingness of game players to spend fifty cents instead of the usual quarter. Right, although *Dragon's Lair* has less than state-of-the-art playability, the high-quality animation gives a good idea of what future videodisc games will look like.

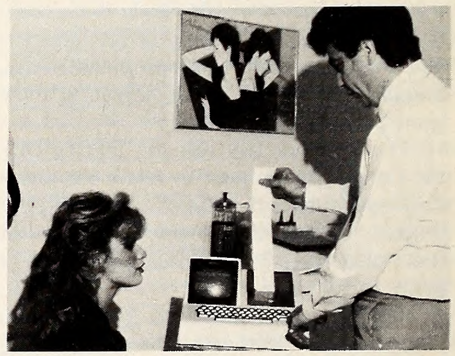
NEWSBITS

☐ **Automation and Society.** The 1983 World Congress on Human Aspects of Automation will be held at the University of Michigan in Ann Arbor, Michigan, August 9–11. Sponsored by the Society of Manufacturing Engineers (SME), the conference's theme is "Living with Automation." Issues to be discussed include job displacement, training, and retraining. For more information, contact SME's technical activities department in Dearborn, Michigan.

☐ **Windy City Robotics.** The computer-engineering division of the American Society of Mechanical Engineers (ASME) is sponsoring the 1983 International Computer in Engineering Conference, to be held August 8–10 at Chicago's Marriott Hotel. More than sixty technical sessions will be held covering robotics, CAD, manufacturing and analysis, and automation. Attendees of the conference will view, test, and evaluate current state-of-the-art computer products. For more information, contact the ASME office in New York City.

☐ **European Robots.** The Palexpo Exhibition Center in Geneva, Switzerland, will be the site of AUTOFACT Europe, to be held September 13–15. Cosponsored by the Institute of Production Engineers (London, England) and the Society of Manufacturing Engineers, the conference will focus on the technologies of automated and computer integrated manufacturing for European production. The daily session for Wednesday, September 14, will be devoted to robotics. Products to be displayed include robots, CAD/CAM, engineering analysis, automated assembly, materials flow and handling, inventory control, inspection, and quality control. Further information can be obtained from the Society of Manufacturing Engineers in Dearborn, Michigan.

☐ **A Hair of a Different Color.** The latest great American institution to enter the "information age" is the beauty salon. James Rocco Hair Designs in Pittsburgh, Pennsylvania, has installed a computer dedicated to taking the guesswork out of hair coloring. Now, when hair designers get ready to color someone's hair at Rocco's salon, they consult a small computer program that holds one



hundred twenty thousand different formulas for determining what shampoo to use, the proper mix of bleaching ingredients and tint solutions, and the processing time needed to neutralize the hair. "Even for the seasoned hair stylist," says Rocco, "there are many variables and some educated guesswork involved to attain a desired hair color. Before coloring anyone's hair, the stylist should know if and how the hair has been colored before, the percentage of gray hair, the texture and thickness of the hair." The computer program, developed by Goldwell Cosmetic in Germany, prompts the stylist with such questions before making its calculations.

☐ **Hotel Talk.** How much are computers becoming a part of everyday life? They're given away with cars, planned for in suburban homes, used in libraries and schools. You can't get away from them, even on vacation. A little over a month ago, HotelTech Inter-

national of Belvedere, California, announced SuiteTalk, a complete personal computer system designed exclusively for use in individual hotel rooms (a similar system was recently announced by TravelHost). Using the SuiteTalk terminal, hotel guests will be able to access HotelNet, a customized database offering all kinds of information and services—everything from the CBS and NBC news services to connection with a home or office computer. HotelTech, which says it will start installing SuiteTalk units in hotels this fall, also plans to offer services such as airline scheduling, message sending, word processing, calculating, and video games. The firm plans to have the system customized for use in hotels during the 1984 Democratic Convention in San Francisco and the 1984 Olympics in Los Angeles.

☐ **Come Play the Friendly Skies?** Can't get enough of video games? Cheer up, they may be available for playing on commercial airline flights as soon as the end of the year. San Jose, California-based Altus Corp. has developed a way to attach hand-held video games to the flip-down food trays found in most modern commercial jets. Two months ago, Canadian Pacific Airlines tested the system, called Airplay, on a flight from Vancouver to Amsterdam. Doug Crane, president of Altus, says the test went very well and other airlines are

"enthused" about the system. Once the end-user reaction has been properly studied—different airlines will be performing tests through the end of the year—it's possible the games will be offered to passengers for a price comparable to that charged for the headsets most airlines offer for listening to prerecorded audio programs. Right now, the airlines are determining which flights and which kinds of customers are the best targets for such in-flight entertainment. Crane also says that Amtrak is interested in testing the system on its passenger trains. If the system is accepted by either the airlines or Amtrak, there could be modest computing power included in the game units later on.

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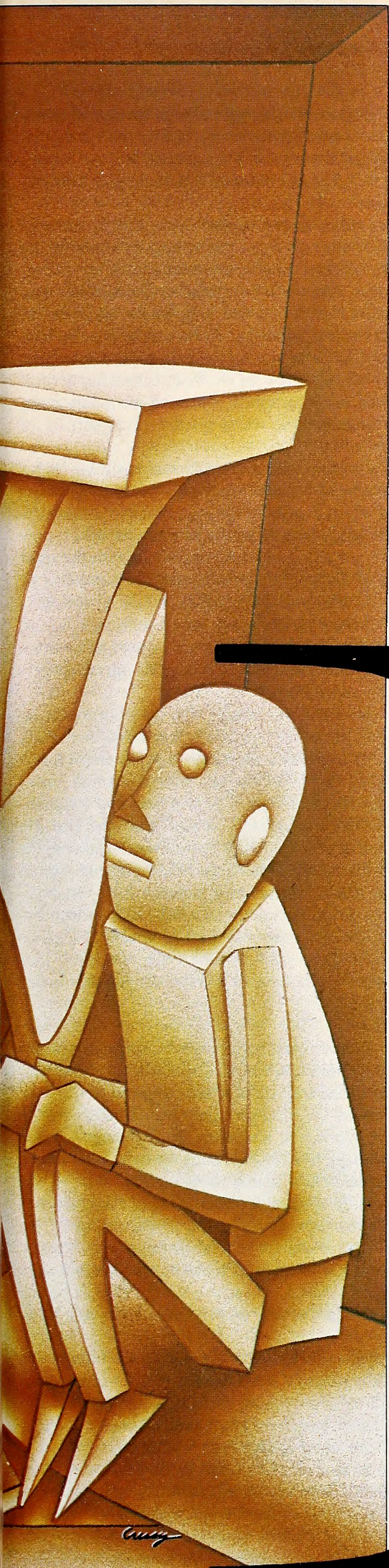

THE Night Breeze ON Watermelon MOUNTAIN

Loretta's head toppled from her shoulders and dropped to the ground.

It wobbled and rolled around a bit, thudding to a halt against the patent-leather shoes of Samuel Q. Pydeondroppe, a.k.a. St. Louis Cadillac Sammy, the undisputed master of the Sister Charlotte Bait and Switch, the Kansas City Wandering Gypsy Blessed Money Ruse, the Cleveland Two for One, the Denver Now-You-See-It-Now-You-Don't, the Los Angeles Sheer Sucker Suit, the Oklahoma Depleted Allowance Shuffle, and a hundred or two other equally effective con games.

Sammy grunted and looked down into the Nile-green eyes that blinked up at him. He bent over and gripped the tangled red strands of Loretta's hair before the night breeze blew them into the flickering flames of the Sterno cans.

Electrons flowed in an alternating current, humming through intricately entwined spider webs of copper. Circuits clicked, memory chips awoke, and a gyro righted itself to restore equilibrium. Loretta blinked twice before weakly smiling.

"Does that happen often?" the young woman opposite Sammy asked.

"She's always going to pieces. An arm here, a leg there, she can't keep herself together." Sammy lifted Loretta's disembodied head and replaced it atop her waiting shoulders. He twisted her neck to the right to secure it firmly in place. Loretta's smile broadened in gratitude.

Sammy's attention shifted back to the young woman. "This is the fourth time today she's lost her head."

"You shouldn't keep count." Loretta's voice box awakened with a

By GEO. W. PROCTOR

Illustration by
MIKE CRESSY

surge of restored power. Her gaze drifted to the ground and she pouted. "It isn't polite."

"She doesn't appear very practical. Newer models are built much better . . . robots that can withstand the normal wear and tear of daily routines," the young woman said. "Why do you keep her?"

Loretta stiffened. Miniature lightning bolts, as though generated by the woman's words, sparked deep within her torso assembly to leap the gap between two circuits. An internal probe tapped the source of distress. Loretta rerouted circuits to bypass the disfunctioning part, then logged a reminder for Andrew to purchase a replacement at his convenience.

"*I* don't . . . *he* does!" Sammy's head tilted to the man huddled just outside the circle gathered about the Sterno cans. "I'm not answerable for what *he* does . . . not anymore."

"He . . . Andrew . . . says I'm human." Loretta interrupted in a soft voice, sensing the need to protect her owner. She added hesitantly, "At least part human, more human than machine."

"More of his crazy talk," Sammy snorted with disgust. "He's always spouting things like that. It's the way his mind works. Totally irrational! Loretta's incapable of functioning with the normal, set precision of an ordinary robot, so he says she's human. What does *he* know? If it weren't for me. . . ."

"How does that make her human?" The young woman pulled a notebook and pen from the deep pocket of her trench coat. "Precision is demanded of every man, woman, and child. We all have our tasks and must carry them out with the exactness that our lifestyle requires. Without it, the whole world would crumble."

Again blue sparks crackled deep within the core of Loretta's chest unit. And again she rerouted circuits to alleviate a minor overload. Something buried in her memory banks tried to push itself forward. But those same electronic etchings told her that to interject comment into the discussion would be useless. She had tried in the past. She was never heard.

"Don't ask me! I told you it was just more of his babblings," Sammy said. His gaze lifted from the flames, first alighting on the young woman's rather attractive face, then her notebook and pen. "Who are you? A reporter?"

The woman nodded.

"Well. . . ." Sammy's disgruntled expression evaporated in the batting of an eye, replaced by a smile designed to charm the hardest of hearts. He sat straight, preened the front of his overcoat, and ran a hand over his slicked-back hair. ". . . I must apologize. I thought you were just another of these hangers-on."

He waved to the three other figures squatted around the cans of burning Sterno. They were motley, as was their campsite. Not at all the type of people one would expect to congregate in the search for a common bond. But just the same, they were there: Harvey Soonerflats, who had attempted to homestead Hollywood and Vine in the late nineties; Sally Plumage, who had been arrested for her erotic dance atop the Tennessee Valley Solar Power Converter during its dedication ceremonies; and William Thunderbird. No one knew much about Billy Thunderbird except that he once hawked mimeographed copies of splendidly composed, but commercially unacceptable, verse on the street corners of Nueva Laredo.

"*He* says they all hold a spark of humanity. Obvious testimony to his madness." Sammy's gaze moved back to the young woman, ignoring Loretta when she rose and whirred away to the man huddled outside the circle. "But that's of little consequence. More to the point would be, how may I assist you? If you've got any questions, you've come to the right man. Whatever he's made of his life, he's got Samuel Q. Pydeondroppe to thank for it. That's Pydeondroppe, P-Y-D-E-O-N-D-R-O-P-P-E."

"Everyone knows about the past few years, his speeches, his visions, his wanderings," the young woman began. "They've even been written up in *True Adventures in Modern Psychology*. What I'm interested in is how it all began, where he came from."

Loretta tried to block out her audio sensors with no success. She received every painful syllable of the conversation. She shook her head.

"Yes." Sammy mulled it over for a moment. "I really don't know exactly where he comes from. But I was the one who discovered him. I was working the old Lonely Hearts . . . uh . . . I was pursuing a romantic interest in the fair city of New Orleans . . . when I first saw him. He was billed as a stand-up comic in a Bourbon Street dive. I can't say he was all that funny, what with his one-liners about the vanishing human race and his one-man war against robots and machine men.

"But I've got an eye for talent and there *was* real talent hidden beneath that rough exterior. All he needed was a bit of polish. If a man's going to make it in this world, he's got to take chances. I took that chance. I walked up to him and announced I'd be his agent, make a star out of a sow's ear, so to speak. . . ."

And so it was after twenty years, seven months, sixteen days, ten hours, and thirty-one minutes (and 41.3 seconds, for those who demand absolute precision in the transition of the temporal dimension) that Andrew came to the place. Or what he hoped would be the place.

However, had he been questioned about the exact location of this place, while he sat there with his head in his hands, he would have been unable to provide an adequate reply to the simple query.

Nor did he bother his mind with such trivialities. For the place was not a static plot of geography securely anchored in the depths of the earth's bedrock bowels. The place was the very fabric of dreams. A realm propelled by the wind's streams, rivers, and maelstroms. It was just as likely to be found floating on the back of some billowy cloud as on the ground. Movement was the nature of the place. Its existence was a study of perpetual motion.

But its weave wasn't all fine threads of silver and gold. Interwoven amid the bright and sparkling beauty were strands of dark terrors and unspeakable horrors, black twines evoking the grotesque ghosties and ghoulies and beasties that haunt and thump in the mind's night. This too was the fabric of dreams, for some dreams are nightmares.

Yet, there are those so set in their orientation to the physical realities of the world that they are unable to visualize the equally valid reality of the place without a description of a parcel of geography.

For those, Andrew's precise location, while it could have been within the exotic pleasure dome of Xanadu, or the hate-festered alleys of New York, or the fertile rain forest of the Amazon, or even the box-on-box

monotony of Greater Suburbia, was a majestic throne of rock set amid the arid vastness of New Mexico's desert.

He was there atop the highest peak of a mountain bearing the very unregal title of Sandia Crest. A mountain named, as legend would have it, by a group of Spanish explorers who thought the towering crest, while caught in the blazing hues of a southwestern sunset, resembled a watermelon. A lack of imagination that left Andrew to ponder what naming of names would have resulted had chance allowed those same explorers to first view the mountain during sunrise.

It was there, atop Sandia Crest, that he sat with his back to the labyrinth of lights sprawled at the foot of the west face of the peak—lights marking the boundaries of Albuquerque. And he waited, occasionally sniffing the clouds that rolled in over the peak from the east only to be caught in the downdraft of the mountain's west cliff and sucked toward the city below.

"Andrew . . . Andrew. . . ." Loretta carefully toned her voice to a low whisper so as to gently intrude into his thoughts.

Andrew looked up to see her tap an eyeball back into its socket.

Loretta glanced away, moved by something she could not define that told her it was unseemly for him to see her in such an awkward position. The stray eyeball firmly screwed back in place. She once again looked at the man.

"Andrew, there's a reporter here," she said. "I don't know how she found out . . . I'm sorry. . . ."

Surging electrons moved within her. She fought an illogical urge to lift her hand and tenderly brush Andrew's cheek with her fingertips.

"No problem, my dear." Andrew assured her with a squeeze of her plastiskin hand. "It's a good omen. A reporter is perfect! Someone to record tonight's events. Perhaps if there are others, they will see the article and follow."

Incomprehensible vibrations shuddered through Loretta's hydraulic fluids. She drew correlations from past interviews. The probable outcome was far less optimistic than Andrew's attitude should indicate.

"I think she'll want to speak with you." Loretta glanced over her shoulder. "Sammy is talking with her now. I don't know if that's wise."

"Don't let it bother you. Sammy's got that spark of humanity too. He just hasn't discovered it." Andrew's gaze drifted to the five figures squatted around the seven cans of flaming Sterno. The blue-and-yellow tongues of fire flickered in the night breeze. He watched their hypnotic dance while Loretta listened.

". . . He's the best meal ticket I've ever latched on to," Sammy said. "His routine about human beings disappearing through a rent in time and space has broke 'em up all the way from Walla Walla to Jersey City. I mean, he really lays 'em in the aisles. The only trouble is, he took himself seriously. Then these bums started popping up. Hell, they're not even groupies! They're *true believers*! At least for a while. They come and go. When he can't produce, they don't believe as hard and they drift away."

That was true, Loretta silently agreed, except for herself. She'd been with Andrew five years. And, of course, Sammy. He'd been around for seven.

"And yourself," the young woman asked, "do you believe?"

"Me? Naw! I told you, he's a meal ticket. My oatcard," Sammy replied with an emphatic shake of his head. "I never minded all the publicity about his being a prophet . . . might have helped it along a bit on occasion. You know, the prophet and his disciples. It adds that mystic touch and gets 'em wondering—stirs the interest."

"And now?"

"He wants to throw it all away!" Sammy grunted. "He's built this thing up so big that if it doesn't come off, he's ruined. Nobody will ever listen to him again. All the late-night talk shows will cancel his appearances. The variety spectaculars will slam their doors in my face. The series I've got lined up goes out the window. And, *if it does come off*, where am I then? Don't get me wrong. I don't think for a moment it will. But if it does, what then? You tell me. I can't win for losing! After all I've done for him, *he* does this to *me*!"

Loretta scrutinized Sammy, trying to find the spark of humanity Andrew found within the man. She couldn't, but neither could she isolate that spark Andrew claimed dwelled within her chassis of stainless steel, rubber, and plastiskin.

The young woman sat silently for a second or two as if unsure of what to say. "I'm expecting a photographer. Do you think he'll mind a few quick shots?"

"He won't mind," Loretta said, whirring beside the young woman. "Andrew said he'll talk with you."

The reporter glanced up, then turned to Andrew. He nodded and smiled. She rose from the Sterno campfire and walked to his side.

"Mr. . . . ."

"Andrew will be fine," he said as he hugged his coat around him. "I've never been one to stand on formalities."

"Andrew . . . there are several questions my readers would like answered," she began.

"And yourself?"

"And me," she replied with a nod. "I know there's been a lot written about you and this, uh, this. . . ."

"The place," Andrew said.

"Yes, this place," she repeated. "But do you mind if we start from the beginning?"

Loretta remained quietly stationed beside the reporter. The woman appeared harmless enough. But others had appeared the same. She still bore a sloppy patch on her stomach as a reminder of a .45 caliber slug meant for Andrew.

"That would be quite all right," Andrew answered with a reassuring smile. "You have to get the facts straight, don't you?"

The young woman nodded. "To begin at the beginning, when did you first feel that human beings were disappearing from the world?"

"I don't know when I first felt it. I first noticed it in '69, right after the first moon landing," Andrew said. "There was mankind taking that giant leap, freeing itself from this ball of clay, opening the way to the universe. Man would soon conquer the stars. Then it stopped.

"I realize there are the shuttle flights and that tin can up there they call a spaceport. But it isn't really space flight. It isn't the stars, or even the planets. It's just busy-work. In all the visions of the future, no one ever thought we'd take that first leap—then stop! But we did . . . or they did."

Loretta sensed a wobbly shifting of her gyros. She knew what ques-

tion would come next. It was always the same. They always asked . . . but never believed the answer.

"They?" The young woman stopped scribbling in her notebook to look up with brows furrowed. "Did I hear you correctly? They?"

"The others, the ones who live, dress, eat, sleep, and work like human beings," Andrew replied without pause. "It's hard to tell them from the real McCoy. I'm not exactly sure what they are. Perhaps they were once human, in a fashion. Or maybe they're just human by-products. But you can spot 'em. That certain gleam is missing from their eyes. Their laugh isn't quite right, a little too loud and a bit off-key. And you'll never catch them daydreaming. They also have an abhorrence to building sandcastles and stargazing. It isn't in their nature."

The reporter glanced up at Andrew again but did not comment. Loretta's gaze rose to the heavens. Stargazing, was that the spark of humanity Andrew spoke of? She could discern no stars above. They were hidden by the thick clouds rolling over the crest.

"Don't get me wrong," Andrew continued. "They're not a bad lot, not in their own way. They're quite industrious. They love building things, and their constructions are quite marvelous. But labor as they will, their efforts are nothing more than exercises in repetition. Every item is a carbon copy of the one before it.

"I don't know when they first began to appear, but they have become the dominant life form in this world. Man is a vanishing species." Andrew paused and sniffed a new cloud bank rolling over the peak. "As I said, I first noticed it back in '69. I was in a tavern with an old friend, a really hearty fellow who once set world records by hitchhiking around the globe ten times consecutively. He was also a fellow who thoroughly enjoyed up-ending a few tall, cool ones. We had just finished off a pitcher of dark when he rose to relieve the distress that accompanies any session of serious beer drinking. I watched him walk through the door marked 'Gentlemen.' He never returned. I was the only one who noticed."

"I asked everyone about Big Jim, but I was the only one who remembered him. Even his wife denied having ever known him," Andrew said. "All she said was, 'Why would I waste my time with a man who spends his life hitchhiking around the world? My husband is an executive with one of this nation's largest advertising firms.' And, of course, he was. And he wasn't Big Jim."

Loretta meticulously scanned the young woman's face in search of a single hint of belief in her passive mask. Her optical sensors registered negative—the expected reading. Probability demanded such a lack of faith from the reporter. The woman reacted with perfect predictability, as a thousand such chroniclers before her had reacted. That security of predictability did nothing to ease the hollowness Loretta sensed within her identity unit.

"Shortly afterward I noticed that all the little old ladies who sold flowers on street corners disappeared. Door-to-door salesmen became a forgotten portion of our history. Magicians and their delightful chicanery were next to go, then sailors, railroad engineers, and cowboys. Of course circus performers and mountain climbers vanished." A wistful smile touched the corners of Andrew's mouth. "One day they were there, and the next day they weren't. Just like that! And nobody noticed.

"There were other things. Adventure series were pulled from the airwaves and replaced by situation comedies. Football and hockey became big items, and baseball was nonexistent. It was only reasonable, I guess, since the others enjoy violence. After all, they need some relief from the monotony of their lives. A correlation can be found in the sudden upswing of the crime rate at this time to the increase of the others populating the world. More and more people vanished and nobody noticed."

Andrew paused again and took another deep whiff of the clouds. He smiled.

A gentle smile moved across Loretta's plastiskin lips while she tightened a finger that insisted in slipping from its socket. In spite of the lack of knowledge on the art of prestidigitation in her memory banks, she could combine the images of flowers and little old ladies on street corners. The vision of smiling, wrinkled faces, disarrayed white hair, surrounded by blossoms of varying hues, brought a calmness within her circuitry.

"Obviously something was happening. People don't just up and disappear—not without some logical explanation," Andrew continued after another whiff of the clouds. "Since I've never put much faith in flying saucers and abductors from the Crab Nebula, I began to search for the answer. That's when I discovered the place, a tear in the fabric of reality—a rent in time and space, a dimension warp, whatever you wish to call it, since it really doesn't matter."

Loretta detected it now in the young woman's face. Skepticism and doubt slightly wrinkling her creaseless forehead. Emptiness returned to fill Loretta. This one was no different than the rest. Andrew's truth was beyond her concept of reality.

Sensing the hopelessness of his position, Loretta turned to Andrew. He too noted the young woman's disbelief, she could see. But he was undaunted and simply smiled and shrugged.

"If what you say is true, why would anyone want to step through this interdimensional warp?" the reporter asked.

"Reverse entropy, of course," Andrew replied. "The others would never seek the rent and the place beyond. But humans seek other humans, even if we do like to keep our distance on occasion."

"And this rent," the young woman asked, "will be here tonight?"

"It's impossible to chart its course, though I can assure you I've tried. It just bounces around in the stream of possibility with chance at the helm," Andrew said. "However, there is a high possibility it will pass this way tonight. Such a high possibility, in fact, that it's a probability."

The young reporter glanced at him again. "And you intend to step into it?"

"Actually, it more or less swallows you up," he said. "Naturally, if I see it coming, I'll walk into it."

"But why here?" she asked. "Why would it come here?"

"While it does ramble around a lot, it tends to seek out regions where humanity still dwells. It hasn't touched the East or West Coasts for ten years. Texas, New Mexico, Arizona, and certain mountains in Kentucky and Tennessee are regularly visited," he answered. "I just missed it three years ago in Upshur County, Texas. Couldn't have been more than a minute or two behind it."

"How did you know? Can you see it?"

Disbelief was more than obvious on the woman's face now, and still she persisted with the interview. Loretta could not understand why Andrew continued. Didn't he understand the mockery she would make of him in her article?

"Smelled it," Andrew said with a broad smile. "The strongest scent I've ever found was there in the East Texas Piney Woods. At least for its more recent visits."

"I thought this was a new phenomenon?" she questioned.

"Oh, no. It's been around—forever, as best as I can determine," Andrew said. "Apparently its size is directly proportional to the size of humanity. In the old days, it really left a smell. When you find one of the old spots, the very old ones, there's still enough of its aroma lingering in the air to tingle the senses. You can get a mighty powerful whiff of it around the small German village of Hamlin. And on certain clear summer nights in London, when you can look up and see the first star of morning, its fragrance just wafts through the city like honeysuckle. Nowadays, you're lucky to get a hint of it in the breeze."

"Can you smell it now?" she asked. "Is it here?"

"It's in the air. But it's not like all the other times." Andrew's nostrils flared as he drew in a deep breath. "I've only smelled where it's been. This time, it's different. I smell it coming."

Loretta sniffed the air. All that wafted in her sensors was the cloud's moisture and the rich aroma of coffee. Adding a note to have all her sensors checked for rust to her list of needed repairs, she glanced to the campsite. Sammy placed an old pot atop one of the cans of Sterno. He held up a cup in offering to the young woman. A shadow moved among the mists beyond the campsite.

"Your photographer's coming, Miss." Loretta pointed a still loose finger at the shadow trudging toward them.

"I think I'd like to try a cup of that coffee, then get some pictures, if you don't mind," the young woman said, turning back to Andrew.

"Not at all." He smiled up at her when she rose. "Photographs would be nice to document what will happen here tonight."

She did not comment, but stepped to the fire and accepted the cup of steaming coffee Sammy handed her. Loretta whirred beside them, listening.

"He's been telling you about smelling it, hasn't he?" Sammy eyed the reporter while she nodded. "I knew it! Can't tell his comedy routine from reality. Smelling it! Can you believe that?"

"Well," she said between sips, "I really can't say that I do."

"No one in their right mind can." Sammy shook his head. "Nobody except these gold-brickers. They believe he smells it. Not that any of them has ever smelled it. Only thing they've ever whiffed is a bit of Sky Dust. But they believe, and they think he's going to step through this rent into another world. And they want to go with him!"

The young woman's lips pursed in disbelief as she turned to the photographer who walked to her side huffing. "Snap a couple of him and let's get out of here. I've got enough for a story."

"Which one do you want snapped?" he asked.

"Him," she said, pointing to Andrew.

Andrew was gone.

"My God! Now he's gone and done it!" Sammy moaned. "He's walked off the edge of the cliff!"

"It swallowed him up." Loretta's voice box warbled a bit. She had seen it, but her logic systems were having a hard time accepting what had transpired. "He stood up and took one step, and it swallowed him up, just like that."

"Don't give me that!" Sammy snapped at his robot companion, ignoring the faces that stared at him. "He wandered off in all this fog and. . . ."

"Honeysuckle," the young reporter said as though to no one but herself.

"What?" Sammy glared at her.

"Just a hint of it in the breeze," Loretta answered. "I smell it."

Filaments tingled with a rush of flowing electrons. Circuits opened and closed. An intangible something whirled and pounded within her metallic torso. "*I* smell *it*!"

"He did it!" Sally Plumage squealed. Unable to restrain the excitement of the moment, her body trembled and shook in a highly provocative manner that was reminiscent of her performance atop the Tennessee Valley Solar Power Converter. "He did it! He did it! He really did it!"

"He wandered the world to find his place. Now he walks the realms of time and space," Billy Thunderbird said. It wasn't splendidly composed verse, but no one seemed to care. After all, it was impromptu, and it fit the moment.

"He's gone," Harvey Soonerflats mumbled. "He's gone and he's left us here."

Sammy didn't say anything, except to grunt in disgust.

The others stood silently, comprehending the full meaning of Harvey's comment. Occasionally their heads rose to sniff the air, but it was gone. Andrew was gone, too, and they were alone.

Abruptly, Loretta turned and whirred away from the dumbfounded group. She moved down the east slope of the mountain with steadfast determination. She knew what she had to do next.

"Hey!" Sammy called after her. "Where do you think you're going?"

"To find Andrew." Loretta stopped to glance back. "And the place."

"Are you completely mad?" Sammy protested.

Madness . . . Loretta comprehended the word when used in the human context. But madness was alien to robots. Or was it? She wasn't certain, though it didn't matter. Nothing held any importance but finding Andrew and joining him in the place.

The young woman, still clutching her notebook, waved Sammy to silence and asked Loretta, "Could you use some company? Two noses are better than one."

The reporter held out a hand. Loretta smiled and accepted it. It was hers. She screwed it back to her wrist while the woman came to her side. Then they both turned to leave.

"Wait up!" Sammy said. "You two can't go wandering off all alone. You'll need help. You'll need somebody who knows the ropes!"

They offered no objections, so he ran after them. After all, he was Samuel Q. Pydeondroppe, and Samuel Q. Pydeondroppe knew a meal ticket when he saw one. And what was the loss of one stand-up comic when there was a team to replace him? An attractive young female and a self-destructing robot—the act would be unbeatable. He could even put up with the hangers-on who followed at his heels, chasing the fragrance of honeysuckle.

Softalk Presents The Bestsellers

June was a pretty good month as months go these days in the Apple market, with several folks marking milestones and business in general improving beyond most expectations.

June was best for Datasoft. Everyone said they might be able to translate *Zaxxon* faithfully on the Atari, but that they would never come close on the Apple. The verdict of the public is overwhelming. They came close.

Zaxxon is the hottest-selling game in the Apple market since *Choplifter* and appears to have the potential to beat even that bellwether program. This is the breakthrough program Datasoft's been seeking for the past two years. They've been relatively strong competitors in other markets, but no program has really taken off for them in the Apple market. *Canyon Climber* was a moderate success, but not a big winner. Now they've got the big winner they need to capture Apple owners' attention.

It couldn't be better timing. The company has been through management shakeups and distractions, and they shelled out substantial dollars for the home computer rights to *Zaxxon*. A lot was at stake, and the June roll of the dice came up a winner for Datasoft.

It was also a pretty significant month for the folks at Software Publishing Corporation. They've nurtured *PFS:File*, and as a result it's consistently been among the top five programs in the Apple market. Sometimes, it's been number two.

This month it's only third, but there's still a story behind that placement. June was the first time in three full years that *PFS:File* managed to overtake *VisiCalc*.

That's a double-barreled milestone. *PFS* has finally conquered the *VisiCalc* mystique. And they have final proof that you can write a program in Pascal that will compete in the big leagues.

June also wasn't a bad month for newcomer Electronic Arts. It was the first month that they had software to sell and, as they had hoped, they found buyers to buy. *Hard Hat Mack* jumped into eighteenth on the Top Thirty and *Axis Assassin* tied for eighth on the Arcade 10 charts.

The company has visions of new genres of entertainment software and new approaches to attracting authors and to marketing product. One month does not a company make, but the omens seem favorable.

June also turned out to be a pretty fair month for the Xerox and *Weekly Reader* people. Their *Stickybear ABC* program hit twentieth on the Top Thirty and it and *Sticky Bear Numbers* both scored on the Education 10.

But, overall, it's still *Apple Writer IIe* dominating sales. New Apple owners are opting for Paul Lutus's word processor in unprecedented numbers. It's by far the fastest-selling piece of software ever to hit the Apple market and is probably second only to *VisiCalc* as the hottest product in microcomputerdom.

The strength of the IIe product is carrying over to the Apple III world, where *Apple Writer III* unseated *VisiCalc:Advanced Version* as the top-selling program among III owners. *Quick File III* was a strong third.

In the Arcade 10 list, *Zaxxon* was dominant, with former leader *Miner 2049er* dropping to second and *Choplifter* to third. The bottom of the list was totally overhauled. *Axis Assassin* tied for eighth, while three

Apple III

This Month	Last Month	
1.	2.	**Apple Writer III,** Paul Lutus, Apple Computer
2.	1.	**VisiCalc:Advanced Version,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	3.	**Quick File III,** Rupert Lissner, Apple Computer
4.	6.	**VisiCalc III,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
5.	4.	**Word Juggler,** Tim Gill, Quark Engineering
6.	5.	**VersaForm,** Joseph Landau, Applied Software Technology
7.	9.	**PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
8.	—	**PFS:Report,** John Page, Software Publishing Corporation
9.	8.	**Apple III Business Graphics,** Apple Computer
10.	7.	**General Ledger,** George Shackelford, State of the Art

Arcade 10

This Month	Last Month	
1.	10.	**Zaxxon,** John Garcia, Datasoft
2.	1.	**Miner 2049er,** Mike Livesay and Bill Hogue, Micro Fun
3.	2.	**Choplifter,** Dan Gorlin, Broderbund Software
4.	5.	**Frogger,** Olaf Lubeck, Sierra On-Line
5.	—	**Hard Hat Mack,** Michael Abbott and Matthew Alexander, Electronic Arts
6.	3.	**Pinball Construction Set,** Bill Budge, BudgeCo
7.	4.	**Aztec,** Paul Stephenson, Datamost
8.	6.	**A.E.,** Broderbund Software
	—	**Axis Assassin,** John Field, Electronic Arts
10.	—	**Lode Runner,** Doug Smith, Broderbund Software
	—	**Maze Craze Construction Set,** Eric Hammond, DTI Data Trek
	—	**Beagle Bag,** Bert Kersey, Beagle Bros

programs tied for tenth in their first appearances on the list.

Hottest of the three is *Lode Runner* from Broderbund. Barely out in June, it looks like another strong entertainment entry. *Maze Craze Construction Set* and *Beagle Bag* were the other programs in the dead heat. *Beagle Bag* really isn't a classic arcade game; on the other hand it doesn't fit any other category, and no other program fits its category. So it gets tracked here by default.

There was a significant shakeup in positions in the Word Processing 10. *Apple Writer IIe* and *Bank Street Writer* retained the top two positions, but *WordStar* leaped into third. *Sensible Speller*, off the list last month, came back to make a strong fourth-place showing. *Super-Text Pro* is also gaining strength and moved into fifth.

Screen Writer II, apparently suffering delays in getting the IIe version out, dropped to sixth, while *Format-II*, in a new configuration, is coming on strong in seventh. *Zardax* showed renewed strength in gaining ninth.

There was also a fair-sized shakeup in the Home Education 10. *MasterType* and *Typing Tutor* stayed at the top of the list. *Apple Logo* moved up to third, with *Stickybear ABC* jumping into fourth. *Ernie's Quiz* rose to fifth, with *Stickybear Numbers* grabbing a tie for sixth.

The other sixth-place finisher was *Type Attack*, regaining the list after a month off. *Snooper Troops I* dropped to a tie for eighth. *Rocky's Boots* made the list for the first time, with *Mix & Match* dropping to tenth.

The education category continues to be the area of strongest growth in the Apple market. There were eleven other programs within striking distance of the bottom rung of the Education 10 and another dozen just slightly behind those.

Word Processors 10

This Month	Last Month	
1.	1.	**Apple Writer IIe,** Paul Lutus, Apple Computer
2.	2.	**Bank Street Writer,** Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
3.	6.	**WordStar,** MicroPro
4.	—	**Sensible Speller,** Charles Hartley, Sensible Software
5.	8.	**Super-Text Pro,** Ed Zaron, Muse
6.	3.	**Screen Writer II,** David Kidwell, Sierra On-Line
7.	9.	**Format-II,** G. K. Beckmann and M. A. R. Hardwick, Kensington Microware
8.	4.	**Magic Window II,** Bill Depew, Artsci
9.	—	**Zardax,** Ian Phillips, Action Research Northwest
10.	7.	**PIE Writer,** Softwest, Hayden

Home Education 10

This Month	Last Month	
1.	1.	**MasterType,** Bruce Zweig, Lightning Software
2.	2.	**Typing Tutor,** Image Producers, Microsoft
3.	8.	**Apple Logo,** Logo Computer Systems, Apple Computer
4.	—	**Stickybear ABC,** Richard Hefter, Jack Rice, Spencer Howe, and Janie and Steve Worthington, Xerox Education Publications
5.	6.	**Ernie's Quiz,** Children's Television Workshop, Apple Computer
6.	—	**Stickybear Numbers,** Richard Hefter and Janie and Steve Worthington, Xerox Education Publications
	—	**Type Attack,** Jim Hauser and Ernie Brock, Sirius Software
8.	3.	**Snooper Troops I,** Tom Snyder, Spinnaker Software
	—	**Rocky's Boots,** Warren Robinett and Leslie Grimm, The Learning Company
10.	5.	**Mix & Match,** Children's Television Workshop, Apple Computer

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The Adventure 5 reverted to an earlier form, with the top four programs being Infocom entries. *Zork I* did the best, with *Zork II*, *Suspended*, and *Deadline* following. Ultrasoft continued to be the spoiler to an all-Infocom category as *The Mask of the Sun* grabbed fifth, with *Zork III* sixth.

The Strategy 5 expanded to seven because of a dead heat for fifth place. All five programs from last month returned. Also involved in the tie were *Spitfire Simulator*, returning from two months previous, and *Old Ironsides*, another new entry from Xerox Education.

The Fantasy 5 remains dominated by *Wizardry*, with *Ultima II* and *Knight of Diamonds* following. *Temple of Apshai* and *Ali Baba and the Forty Thieves* rejoined the list, bumping *Missing Ring* and *Ultima*.

There was a significant change in the Business 10. June was the first month in the history of the *Softalk* poll in which *VisiCalc* was not the leading program. *PFS:File* not only grabbed first, but pulled *PFS:Report* up a notch to fourth. *Multiplan* continued to stalk *VisiCalc*, as it moved up a notch to third. *Quick File IIe* dropped to fifth.

The Business 10 may be reflecting a change in the composition of new Apple owners. Not only is this the first month that *VisiCalc* has failed to head the list, it is also the first month in which a powerful database program has failed to make the ranks. *PFS:File* and *Quick File IIe* qualify as file handlers rather than as database managers. The choice of

Adventure 5

This Month	Last Month	
1.	4.	**Zork I,** Infocom
2.	—	**Zork II,** Infocom
3.	1.	**Suspended,** Michael Berlyn, Infocom
4.	3.	**Deadline,** Infocom
5.	4.	**The Mask of the Sun,** Chris Anson, Alan Clark, Larry Franks, and Margaret Anson, Ultrasoft

Strategy 5

This Month	Last Month	
1.	1.	**Castle Wolfenstein,** Silas Warner, Muse
2.	2.	**Flight Simulator,** Bruce Artwick, SubLogic
3.	4.	**Sargon II,** Dan and Kathe Spracklen, Hayden
4.	4.	**Cosmic Balance II,** Paul Murray, Strategic Simulations
5.	3.	**Rendezvous,** Wes Huntress, Edu-Ware Services
	—	**Old Ironsides,** Richard Hefter and Jack Rice, Xerox Education Publications
	—	**Spitfire Simulator,** Ted Kurtz, Mind Systems

Fantasy 5

This Month	Last Month	
1.	1.	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
2.	2.	**Ultima II,** Lord British, Sierra On-Line
3.	3.	**Knight of Diamonds,** Andrew Greenberg and Robert Woodhead, Sir-tech
4.	—	**Temple of Apshai,** Epyx/Automated Simulations
5.	—	**Ali Baba and the Forty Thieves,** Stuart Smith, Quality Software

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For other testimonials, look for products from Sierra On-Line, Sir-Tech, Mattel Electronics, Datamost, Adventure International, Sentient Software, Software Productions, Scholastic, and others that use *The Graphics Magician*.

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these programs over *DB Master*, twelfth this month, *VisiFile*, thirteenth, *General Manager*, fourteenth, and *dBase II*, sixteenth, could be an indication of widely diverse trends.

On the one hand, sophisticated users tying into mainframe databases no longer require powerful database managers resident in their desktop computers. That some Apples are going in that direction is reflected in the heavy sales of *Softerm* and *Micro/Terminal*.

On the other hand, home users bent on using the Apple for educational purposes have no need for anything other than relatively simple

Business 10

This Month	Last Month	
1.	2.	**PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
2.	1.	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	4.	**Multiplan,** Microsoft
4.	5.	**PFS:Report,** John Page, Software Publishing Corporation
5.	3.	**Quick File IIe,** Rupert Lissner, Apple Computer
6.	6.	**PFS:Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
7.	7.	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
8.	—	**General Ledger,** George Shackelford, State of the Art
9.	10.	**The Incredible Jack,** Business Solutions
10.	—	**Apple II Business Graphics,** Apple Computer

Hobby 10

This Month	Last Month	
1.	1.	**Double-Take,** Mark Simonsen, Beagle Bros
2.	3.	**Apple Mechanic,** Bert Kersey, Beagle Bros
	2.	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
4.	5.	**Utility City,** Bert Kersey, Beagle Bros
5.	7.	**Apple Pascal,** Apple Computer
	8.	**Zoom Grafix,** Dav Holle, Phoenix Software
7.	10.	**Graphics Magician,** Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
8.	3.	**Pronto DOS,** Tom Weishaar, Beagle Bros
9.	6.	**Bag of Tricks,** Don Worth and Pieter Lechner, Quality Software
10.	—	**Typefaces,** Bert Kersey, Beagle Bros

Home 10

This Month	Last Month	
1.	1.	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	2.	**ASCII Express:The Professional,** Bill Blue and Mark Robbins, Southwestern Data Systems
3.	5.	**Dow Jones Market Analyzer,** RTR Software and Dow Jones & Company, Dow Jones Software
4.	3.	**Data Capture 4.0,** George McClellan and David Hughes, Southeastern Software
5.	—	**Softerm,** Lynn Stricklan, Softronics
6.	—	**Micro/Terminal,** Microcom
7.	7.	**Transend 1,** Tim Dygert and Bob Kniskern, SSM
8.	9.	**Know Your Apple IIe,** Muse
9.	6.	**Hayes Terminal Program,** Hayes Microcomputer Products
	—	**Transend 2,** Tim Dygert and Bob Kniskern, SSM

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file handling. That is best seen in the strength of educational software sales.

The Hobby 10 became even more of a Beagle Bros domain, if that's possible. In June, they placed six of the ten on the list, including the top four. *Double-Take* stayed on top, with *Apple Mechanic* and *DOS Boss* tied for second. *Utility City* was fourth, *Pronto DOS* was eighth, and *Typefaces* was tenth.

Even with all those sales, the Brothers Beagle give no indication of getting a shave in the near term.

The other Hobby 10 programs were long-running veterans—*Apple Pascal*, *Zoom Grafix*, *Graphics Magician*, and *Bag of Tricks*.

Even as the Hobby 10 is becoming the Beagle Bros Memorial Chart, so the Home 10 is becoming the domain of communications programs.

Home Accountant remained by far the leader of the group. *Dow Jones Market Analyzer* moved up to third, and *Know Your Apple IIe* nabbed eighth. All the rest were communications packages.

ASCII Express: The Professional held on to a solid second and even moved into the Top Thirty. *Data Capture 4.0* was fourth. *Softerm* and *Micro/Terminal*—packages probably used more in a business environment than in the home—scored fifth and sixth respectively.

Apple-franchised retail stores representing approximately 7.4 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

Respondents were contacted early in July to ascertain their sales for the month of June.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preferences of the individual respondents were not considered.

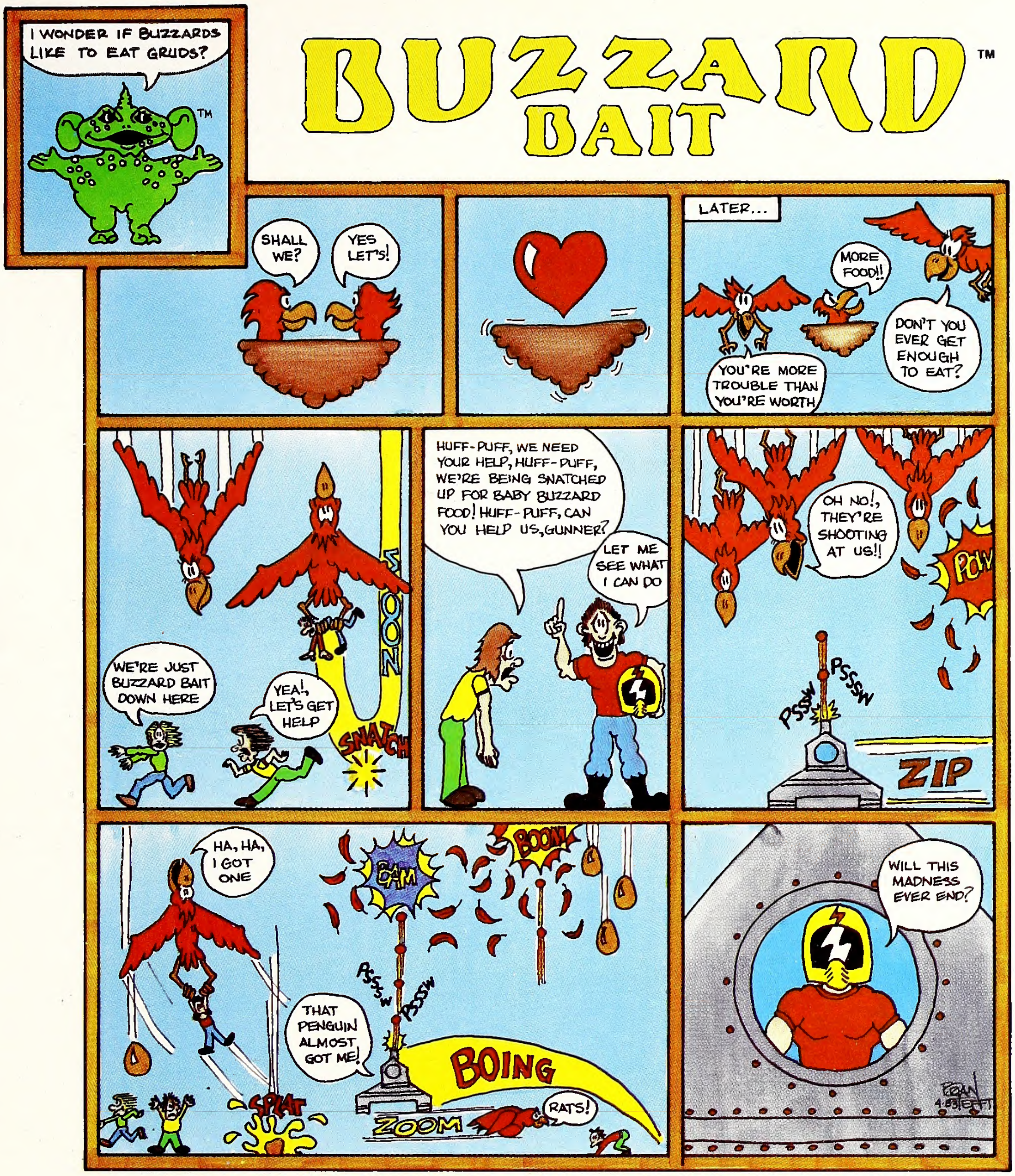
Respondents in July represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only to the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 3.31 percent, which translates roughly into the theoretical possibility of a change of 3.58 points, plus or minus, in any index number.

The Top Thirty

This Month	Last Month	Index	
1.	1.	167.91	**Apple Writer IIe,** Paul Lutus, Apple Computer
2.	—	97.68	**Zaxxon,** John Garcia, Datasoft
3.	5.	92.09	**PFS:File,** John Page and D. D. Roberts, Software Publishing Corporation
4.	3.	70.70	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
5.	4.	56.51	**MasterType,** Bruce Zweig, Lightning Software
6.	10.	55.81	**Multiplan,** Microsoft
7.	2.	50.70	**Home Accountant,** Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
8.	8.	44.65	**Miner 2049er,** Mike Livesay and Bill Hogue, Micro Fun
9.	14.	43.49	**PFS:Report,** John Page, Software Publishing Corporation
10.	7.	39.53	**Bank Street Writer,** Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
11.	11.	37.67	**Choplifter,** Dan Gorlin, Broderbund Software
12.	9.	35.58	**Quick File IIe,** Rupert Lissner, Apple Computer
13.	6.	30.69	**Wizardry,** Andrew Greenberg and Robert Woodhead, Sir-tech
14.	16.	25.58	**Typing Tutor,** Image Producers, Microsoft
15.	29.	22.32	**Apple Logo,** Logo Computer Systems, Apple Computer
16.	—	20.69	**WordStar,** MicroPro
17.	—	18.37	**Frogger,** Olaf Lubeck, Sierra On-Line
18.	—	17.67	**Hard Hat Mack,** Mike Abbott and Matthew Alexander, Electronic Arts
19.	29.	16.28	**PFS:Graph,** Bessie Chin and Stephen Hill, Software Publishing Corporation
20.	—	15.11	**Stickybear ABC,** Richard Hefter, Jack Rice, Spencer Howe, and Janie and Steve Worthington, Xerox Education Publications
21.	12.	14.88	**Double-Take,** Mark Simonsen, Beagle Bros
22.	—	14.41	**ASCII Express:The Professional,** Bill Blue and Mark Robbins, Southwestern Data Systems
23.	—	13.72	**Zork I,** Infocom
24.	25.	13.02	**Ernie's Quiz,** Children's Television Workshop, Apple Computer
25.	—	12.79	**Castle Wolfenstein,** Silas Warner, Muse
26.	—	12.09	**BPI General Ledger,** John Moss and Ken Debower, Apple Computer
	18.	12.09	**Apple Mechanic,** Bert Kersey, Beagle Bros
	15.	12.09	**DOS Boss,** Bert Kersey and Jack Cassidy, Beagle Bros
29.	13.	11.62	**Ultima II,** Lord British, Sierra On-Line
30.	—	11.16	**Flight Simulator,** Bruce Artwick, SubLogic
	26.	11.16	**Utility City,** Bert Kersey, Beagle Bros



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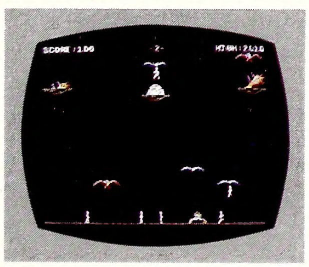
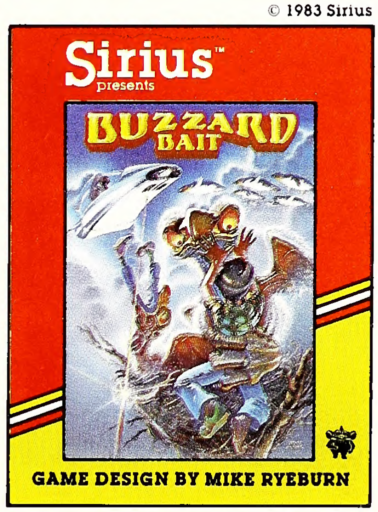
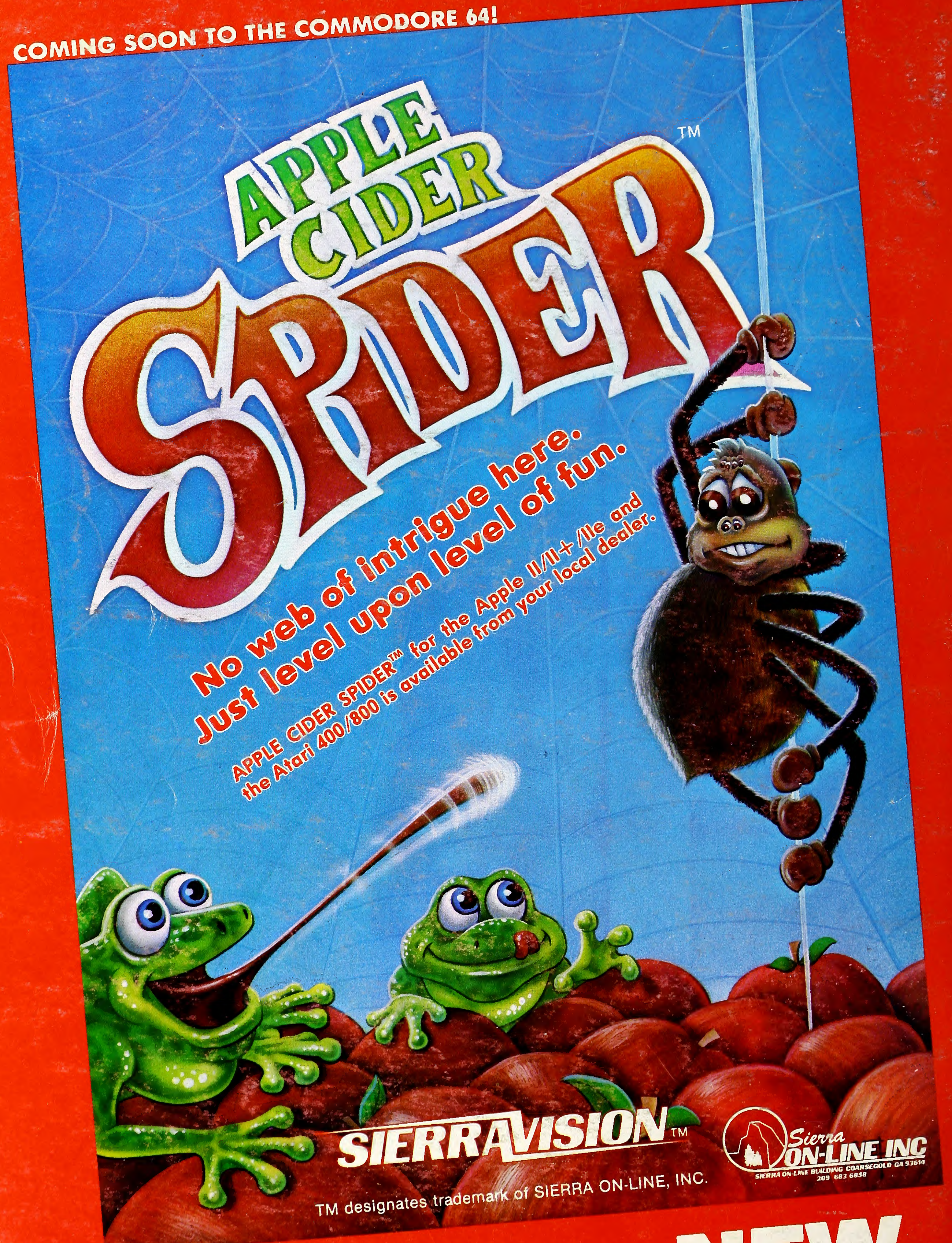


Apple II, II+ & IIe Disk
IBM-PC Disk



Game design by Mike Ryeburn.
IBM-PC version programmed by Uriah Barnett.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